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DRAFT ENVIRONMENTAL ASSESSMENT

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TRANSFER OF FUEL AND FIRE FIGHTING TRAINING SCHOOLS
FROM
CHANUTE AIR FORCE BASE, ILLINOIS
TO
GOODFELLOW AIR FORCE BASE, TEXAS

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INTRODUCTION

The Defense Secretary's Commission on Base Realignment and Closure ("Commission or CBRC") was chartered on 3 May 1988 by the Secretary of Defense to recommend military installations within the United States, its commonwealths, territories, and possessions for realignment and closure. Subsequently, the Base Closure and Realignment Act (Public Law 100-526, 24 October 1988) endorsed the Secretary's Commission and required the Secretary of defense to implement its recommendations unless either he rejected them in their entirety or the Congress passed (and the President signed) a Joint Resolution disapproving the Commission's recommendations.

The primary criterion used by the Commission for identifying candidate bases was the military value of the installation. However, cost savings were also considered, as were the current and projected plans and requirements for each military service. Lastly, the Commission focused its review on military properties and their uses, not military units or organizational/administrative issues.

On 29 December 1988, the Commission recommended the realignment and closure of 145 military installations. of this number, 86 are to be closed fully, 5 are to be closed in part, and 54 will experience a change (either an increase or decrease) as units and activities are relocated.

On 5 January 1989, the Secretary of Defense approved those recommendations and announced that the Department of Defense would implement them. The Congress did not pass a Joint Resolution disapproving the recommendations within the time allotted by the Act.

Therefore, the Act now requires the Secretary of Defense, as a matter of law, to implement those closures and realignments. Implementation must be initiated by 30 September 1995. Thus, this Environmental Assessment (EA)(realignment) for Goodfellow Air Force Base is by law a final one.

The Base Closure and Realignment Act requires the implementing actions to conform to the provisions of the National Environmental Policy Act of 1969 (NEPA), as implemented by the President's council on Environmental Quality (CEQ) regulations. In addition, this EA also follows Air Force Regulation (AFR) 19- 2, which implements both NEPA and the CEQ regulations within the Air Force system. However, the Act also modified NEPA to the extent that the environmental analysis need not consider:

- (i) the need for closing or realigning a military installation selected for closure or realignment by the Commission;
- (ii) the need for transferring functions to another military installation which has been selected as the receiving installation; or
- (iii) alternative military installations to those selected.

DRAFT
FINDING OF NO SIGNIFICANT IMPACT

Goodfellow Air Force Base

The United States Air Force, Air Training Command, is transferring the fuel and fire fighting Training from Chanute Air Force Base, Illinois, to Goodfellow Air Force Base, Texas, in compliance with Public Law 100-526, Defense Authorization Amendments and Base Realignment and Closure Act. Public Law 100-526 excluded the requirement of the National Environmental Policy Act (NEPA), Public Law 91-190, as amended, for the discussion of alternatives to the actions of the Secretary of Defense (SECDEF) Commission on Base Realignment and Closure and for the SECDEF decision to accept the Commission recommendation. Public Law 100-526 also states that the Air Force does not have to address the purpose and need for closure actions, or identify alternative military installations to those selected by the Commission. However, a discussion of alternatives and identification of the impacts for the location of the Fuel and the Fire Training facilities at Goodfellow Air Force Base (AFB) is necessary to be in full compliance with NEPA.

The following alternatives to the proposed action were initially considered:

The "No Action" alternative was excluded from consideration under the National Environmental Policy Act by PL 100-526, therefore, this alternative was not considered further.

Alternative 1 was developed in an Air Force Planning Assistance Team Report which was completed in March 1989. This alternative has the least adverse environmental impacts of the other three alternatives. This alternative uses the eastern half of the of Goodfellow Air Force Base where the existing abandoned runways are located. The alternative would involve the construction and relocation of the Department of Transportation (DOT) tire test track and the proposed fuel and fire fighting training facilities to the northern portion of the base. A satellite communications facility (SATCOM) is proposed to be located on the southern portion of this area. Other existing facilities would not be affected. No conflict between facility uses exists with this alternative.

Alternative 2 would require relocation of the DOT tire test track as discussed in Alternative 1. The proposed SATCOM facility would be moved to the northern portion of the base immediately south of the DOT tire test track. The burn pits would be relocated south and west of the intersection of the the two runways. This alternative would provide a greater visual buffer distance from the residential area which is located immediately adjacent to the northern boundary of the base. This would necessitate that the fire fighting training facility utilize the existing northeast-southwest runway, causing severe traffic conflicts. Optimal distance between the fuel storage area and the burn pits could not be achieved with this alternative..

Alternative 3 would involve locating both the fuel and fire fighting training facilities off-base. This would allow the SATCOM facility to be constructed on-base without any interference from the fuel and fire fighting training facilities. Also the DOT track could remain in it's present location which would eliminate construction costs. There are, however, significant negative impacts associated with this alternative. This alternative would require additional land acquisition, construction of drinking water facilities, a change building with showers, and dining facilities. Since the area would be isolated, there would be a need for an additional security system. An off site alternative would require that students be transported to and from the remote facilities which would increase transportation costs and decrease training efficiency. Finally, in case of an injury accident, there would be no immediate access to medical facilities.

Based on the Environmental Assessment (EA) and results of coordination, I have determined that the site selection of alternative 1 has the least environmental impact and will not have any adverse impacts on public, Federal or state environmentally sensitive areas, natural resources, or any Federally listed threatened or endangered species. I have also determined that there should be no significant adverse environmental impacts associated with the alternative locations. I have determined that the proposed action will not have a significant adverse effect upon the natural or manmade environments and, therefore, will not require preparation of an Environmental Impact Statement.

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EXECUTIVE SUMMARY

DRAFT ENVIRONMENTAL ASSESSMENT TRANSFER OF FUEL AND FIRE FIGHTING TRAINING SCHOOLS FROM CHANUTE AIR FORCE BASE, ILLINOIS TO GOODFELLOW AIR FORCE BASE, TEXAS

1. Purpose and Need

In accordance with Public Law 100-526, Defense Authorization Amendments and Base Realignment and Closure Act, dated June 1988, it is to relocate necessary for the fire fighting and fuel training facilities, presently located at Chanutte, Air Force Base to be relocated to Goodfellow Air Force Base, San Angelo, Texas. The Base Realignment and Closure Commission determined that there is a need for this realignment in order to help reduce Government military spending.

2. Summary of Alternatives

Public Law 100-526 excluded the requirement of the National Environmental Policy Act (NEPA), Public Law 91-190, as amended, for the discussion of alternatives to the actions of the Secretary of Defense (SECDEF) Commission on Base Realignment and Closure and for the SECDEF decision to accept the Commission recommendation. Public Law 100-526 also states that the Air Force does not have to address the purpose and need for closure actions, or identify alternative military installations to those selected by the Commission. However, a discussion of alternatives and identification of the impacts for the location of the Fuel and the Fire Training facilities at Goodfellow Air Force Base (AFB) is necessary to be in full compliance with NEPA.

Four alternatives of the proposed action were initially considered:

The "No Action" alternative was exempted by Public Law 100-526 from consideration under the National; Environmental Policy Act, therefore, this alternative was dropped from further consideration.

Alternative 1 was developed in a Air Force Planning Assistance Team Report which was completed in March 1989. This alternative has the least adverse environmental impacts of the other three alternatives. This alternative uses the eastern half of the of Goodfellow Air Force Base where the existing abandoned runways are located. The alternative would involve the construction and relocation of the Department of Transportation (DOT) tire test track and the proposed fuel and fire fighting training facilities to the northern portion of the base. A satellite communications facility (SATCOM) is proposed to be located on the southern portion of this area. Other existing facilities would not be affected. No conflict between facility uses exists with this alternative.

Alternative 2 would require relocation of the DOT tire test track as discussed in Alternative 1. The proposed SATCOM facility would be moved to the northern portion of the base immediately south of the DOT tire test track. The burn pits would be relocated south and west of the intersection of the the two runways. This alternative would provide a greater visual buffer distance from the residential area which is located immediately adjacent to the northern boundary of the base. This would allow the fire fighting training facility to utilize the existing northeast-southwest runway while enroute to the aircraft drive around spray facility, which would be located at the northeast end of the northeast-southwest runway.

The fire truck acceleration distance required for the aircraft approach and spray down facility may not be suited for placement at the end of the northeastern-southwestern runway. This placement may cause conflicts with smaller vehicle traffic patterns at the fuel training facility. Those activities that occur at the vehicles approach, hose area, and refueling area can not efficiently operate on the same roadway at the same time due to the different vehicles being used and the rate of speed at which they must operate.

The fuel storage facility is proposed to be located at the southern apex of the fuel training area. This location could be in conflict with the burn pit since the fuel storage facility should be located as far as possible from the burn pits while remaining within site limitations.

Alternative 3 would involve locating both the fuel and fire fighting training facilities off-base. This would allow the SATCOM facility to be constructed on-base without any

interference from the fuel and fire fighting training facilities. Also the DOT track could remain in it's present location which would eliminate construction costs.

There are significant negative impacts associated with this alternative. For example, this alternative would require additional land acquisition, construction of drinking water facilities, a change building with showers, and dining facilities. Since the area would be isolated, there would be a need for an additional security system. An off site alternative would require that students be transported to and from the remote facilities which would increase transportation costs and decrease training efficiency. Finally, in case of an injury accident, there would be no immediate access to medical facilities.

3. Summary of Environmental Impacts.

Direct, adverse environmental impacts of the construction of the fuel and fire fighting training facilities would include fugitive dust and noise during the construction phase. After construction there would be direct effect of air pollution as a result of burning jet fuel, JP-4, which would cause plumes of dense black smoke containing particulates. Based on the results of the health physicals given to the individuals tested at the Brayton fire fighting training school and on the information contained in the EA, no significant air quality impacts are predicted to result from the fire fighting training. The removal of approximately 300 acres of disturbed mesquite-grassland habitat would occur with the proposed action. Adverse water quality impacts could occur in the event that rainfall exceeds the capacity of the detention system. Minimal impacts to existing water supplies are expected. Beneficial effects would include increased fire fighting and fuel training capability which would result in international benefits at bases all over the world.

4. Conclusions

Goodfellow AFB and the City of San Angelo are socioeconomically dependent on each other. The addition of the incoming personnel and training should show an increase in the local economy. Any negative environmental effects caused by expanding the Air Force facilities at Goodfellow AFB regarding noise, air, water, soil erosion, solid waste, are considered minimal and, for the most part, controllable under many of the Air Force programs and policies in effect.

5. Unresolved Issues

All known environmental issues have been addressed and resolved with the exception of cultural resources. Prior to the start of any construction a cultural resource survey must be conducted to determine if significant cultural resources exist. After this inventory, and if important archeological sites are recorded, mitigation measures will be considered in coordination with the Texas State Historic Preservation Officer and the National Advisory Council on Historic Preservation.

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**DRAFT ENVIRONMENTAL ASSESSMENT
TRANSFER OF FUEL AND FIRE FIGHTING TRAINING SCHOOLS
FROM
CHANUTE AIR FORCE BASE, ILLINOIS
TO
GOODFELLOW AIR FORCE BASE, TEXAS**

Responsible Agency: United States Air Force
Air Training Command

Proposed Action: Realignment of Fuels and Fire Fighting Training from Chanute Air Force Base, Illinois, to Goodfellow Air Force Base, Texas

Responsible Individual: Ms. Cathrine Hitchens
United States Air Force
Air Training Command
Randolph Air Force Base, Texas
(512) 652-3240

Environmental Assessment

Abstract: By Public Law 100-526, Defense Authorization Amendments and Base Realignment and Closure Act, dated June 1988, it is necessary for the fuels and fire fighting training facilities, presently located at Chanute, Air Force Base to be relocated to Goodfellow Air Force Base, San Angelo, Texas. The Base Realignment and Closure Commission determined that there is a need for this realignment in order to help reduce Government military spending. The Environmental Assessment (EA) presents the problems associated with the existing conditions and describes the parameters associated with site selection process and evaluates the alternative actions. This EA also identifies environmental impacts to cultural resources, vegetation, wildlife, water resources and socioeconomics.

I. PURPOSE AND NEED

A. General Description

Goodfellow AFB is located in San Angelo, Tom Green County, Texas (figure I-1). Goodfellow AFB was officially opened in 1941 as an aviation training base. This basic mission continued until October 1958 when jurisdiction was transferred from Air Training Command (ATC) to USAF Security Service. The base was redesignated as an ATC facility in 1978. The mission of the installation since 1958 has been to train military personnel for the worldwide cryptologic mission.

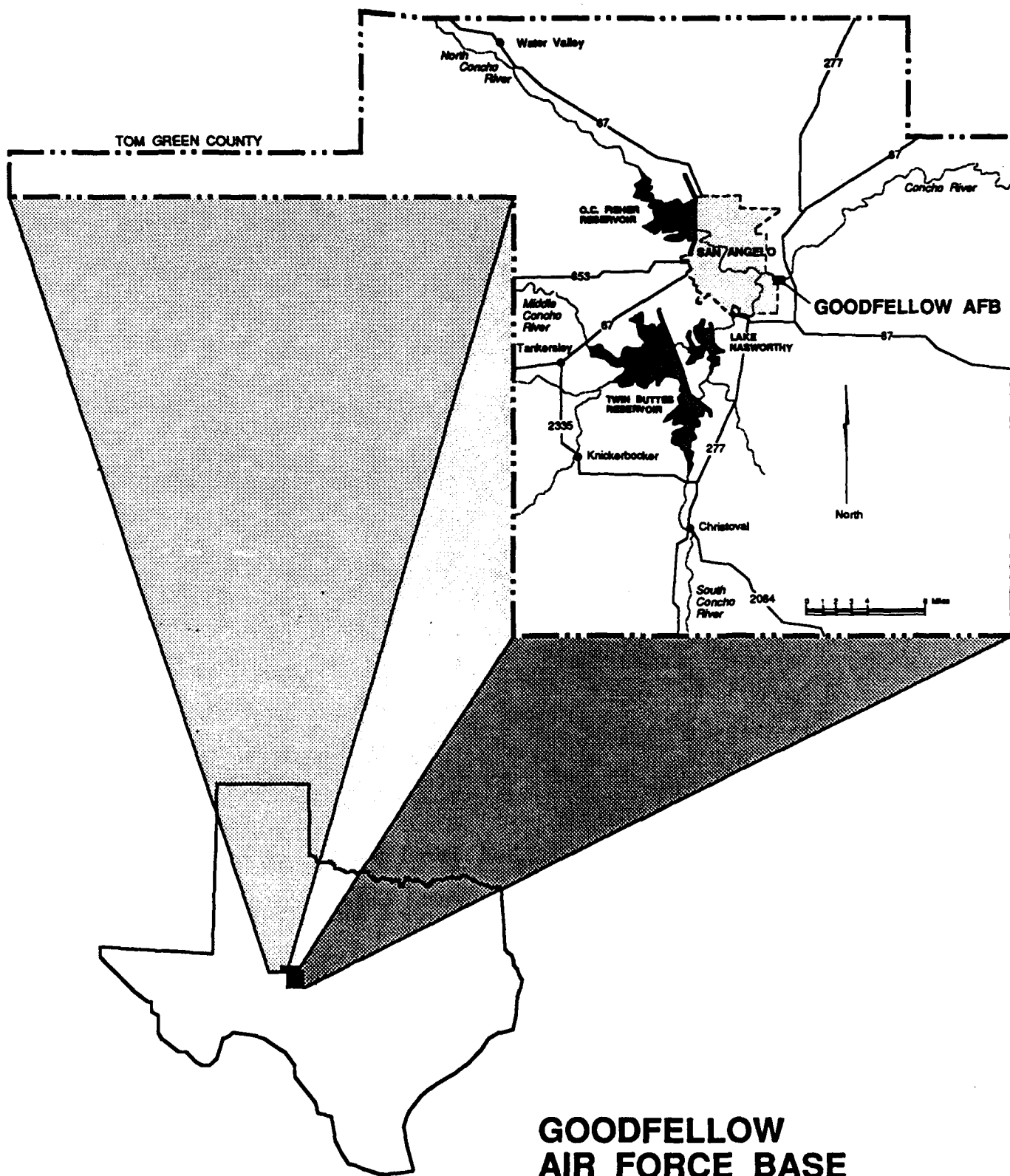
Goodfellow AFB is situated on 1,135 acres (459 hectares) of land in West Central Texas approximately 3 miles (5 kilometers (km)) southeast of the city of San Angelo's central business district (Figures 1 and 2). The real estate and facilities of Goodfellow AFB are owned by the Air Force, with the exception of a 15 acre (6 hectare) off-base recreational site leased from the City of San Angelo (Fisher 1978). The runways at Goodfellow were officially deactivated in May 1975. They are currently used for tire testing by the Department of Transportation (DOT) as part of the Uniform Tire Grading Facility operation located at Goodfellow AFB. DOT also uses three additional base facilities adjacent to the runways in connection with this operation.

Goodfellow AFB is currently the home of the Goodfellow Technical Training Center, the 3498 Technical Training Wing, 3480 Air Base Group, and other Department of Defense units. Goodfellow AFB has approximately 1,950 active military and 1,300 civilian employees. Average daily student load is about 2,100. Total active base population is approximately 3,250.

The fuel and fire fighting schools presently located at Chanute AFB, Illinois are to be transferred to Goodfellow AFB.

B. Background

In 1969, the U.S. Congress passed the National Environmental Policy Act (NEPA) PL 91-190 (42 U.S.C. 4341). NEPA requires Federal agencies to make information available on the environmental impacts of its proposed actions. Section 102(2)(C)



GOODFELLOW AIR FORCE BASE

TOM GREEN COUNTY, TEXAS

Figure I-1

requires an environmental impact statement (EIS) to be prepared for major Federal actions significantly affecting the quality of the human environment. The Council on Environmental Quality (CEQ) issued regulations based on NEPA and Executive Order 11514 and 11991 which provide Presidential direction to Federal agencies to implement NEPA's requirements.

Public Law 100-526 waived NEPA compliance for the decisions of the SECDEF's Commission on Base Realignment and Closure and for SECDEF's decision to accept the Commission recommendations. Public Law 100-526 also states that the Air Force need not address the purpose and need for closure actions, nor identify alternative military installations to those selected by the Commission. However, any other recommendations considered in these closure documents must be addressed in full compliance with NEPA.

C. Proposed Action

The proposed action is to move both Fuels Training and Fire Fighting Training /Aircraft Rescue from Chanute AFB, Illinois, to Goodfellow AFB, Texas. The average daily student load (ADSL) will increase by 212 for fuels training and 287 for the fire fighting training. The permanent party at Goodfellow AFB will increase by 295.

The fire fighting training requires burning of approximately 20,000 gallons of JP-4 per month, with 8 - 10 fires per day. Two of these fires burn 300 gallons of JP-4 each. The other fires burn on a much smaller scale. The prevailing winds vary widely. On calm days, the smoke from the large fires may climb approximately 2,000 feet above the ground. This smoke usually dissipates within 12 minutes. The quantity of JP-4 used depends on the type of fire simulated. A test to simulate a wheel fire uses as little as 50 gal of JP-4 while a test to simulate a major fire uses as much as 750 gal of JP-4.

New construction will include a storm water detention area, unenlisted personnel housing, proposed SATCOM facility, an impound lot, kennel, drafting pit, wash rack, vehicle maintenance building, fire training building, relocation of the DOT tire test track, burn area with a change building, burn house, hose pad, burn pad, hazardous materials training area, an aircraft drive around and spray facility, liquid oxygen training building, liquid fuels training building, fuel storage area, and a C-130 pad.

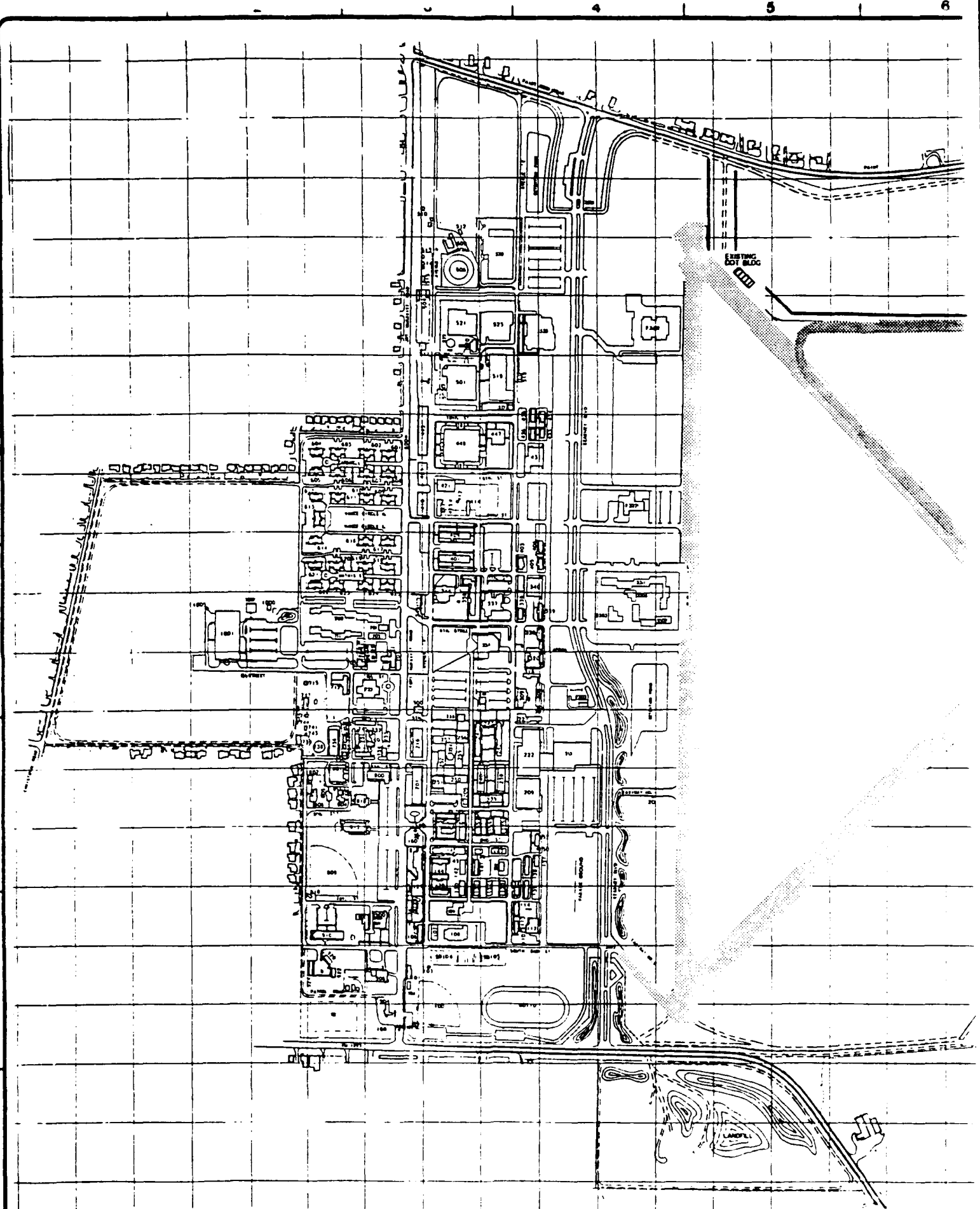
II. ALTERNATIVES

A. General

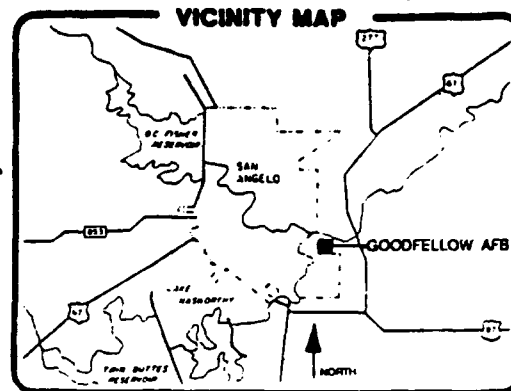
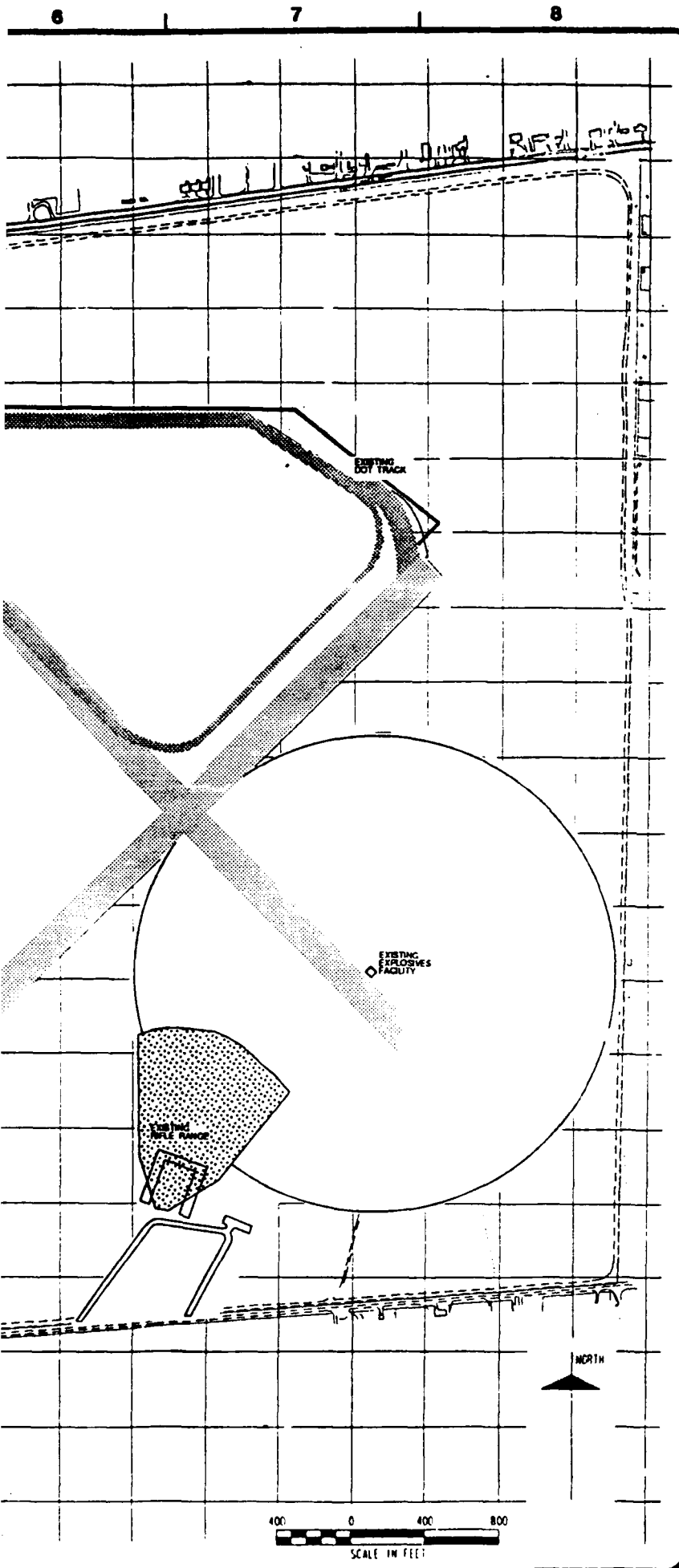
The existing buildings and recreational areas at Goodfellow AFB are located mainly on the western half of the base which leaves only the eastern half of the base to be considered for the location the fuel and fire fighting training facilities (figure II-1). The compactness of this base and the clear zone requirements already severely limit the flexibility of placing interdependent functions adjacent to one another. There is a Department of Transportation (DOT) test track located immediately north of the intersection of the two abandoned runways and a DOT building which is located on the north side near the end of the Northwest runway. There is an explosive storage facility located on the north side near the Southeastern end of the Northwest-Southeast runway which requires a 1250 foot clear zone. Additionally, there is a small arms shooting range located in the middle of the eastern half of the base near the southern boundary of the base. There is a small fire training structure located west of the intersection of the two abandoned runways.

B. "No Action" Alternative.

The "No Action" alternative is defined as continuing to conduct fuels and fire training for the Air Force at Chanute AFB. In 1988, however, in the interest of operational efficiency and mission consolidation, the Secretary of Defense created a bipartisan commission to identify facilities, property, and installations which are no longer essential to current or programmed defense requirements. The Commission's recommendations included transfer of the fuels and fire fighting training schools from Chanute AFB, Illinois to Goodfellow AFB, Texas. The "No Action" alternative, therefore, would result in substantial cost inefficiencies to the people of the United States as identified by the Commission on Base Realignment and Closure. Congress has accordingly endorsed the Commission's closure/realignment recommendations and exempted them from consideration under the National Environmental Policy Act. The "No Action" alternative, consequently, has been dropped from further consideration.







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LEGEND

-  EXISTING RUNWAYS
-  EXISTING DEPARTMENT OF TRANSPORTATION
-  EXISTING EXPLOSIVES FACILITY
-  EXISTING RIFLE RANGE

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

GOODFELLOW AIR FORCE BASE
SAN ANGELO, TEXAS

EXISTING FACILITIES

SHEET 1 OF 1

FIGURE 11-1

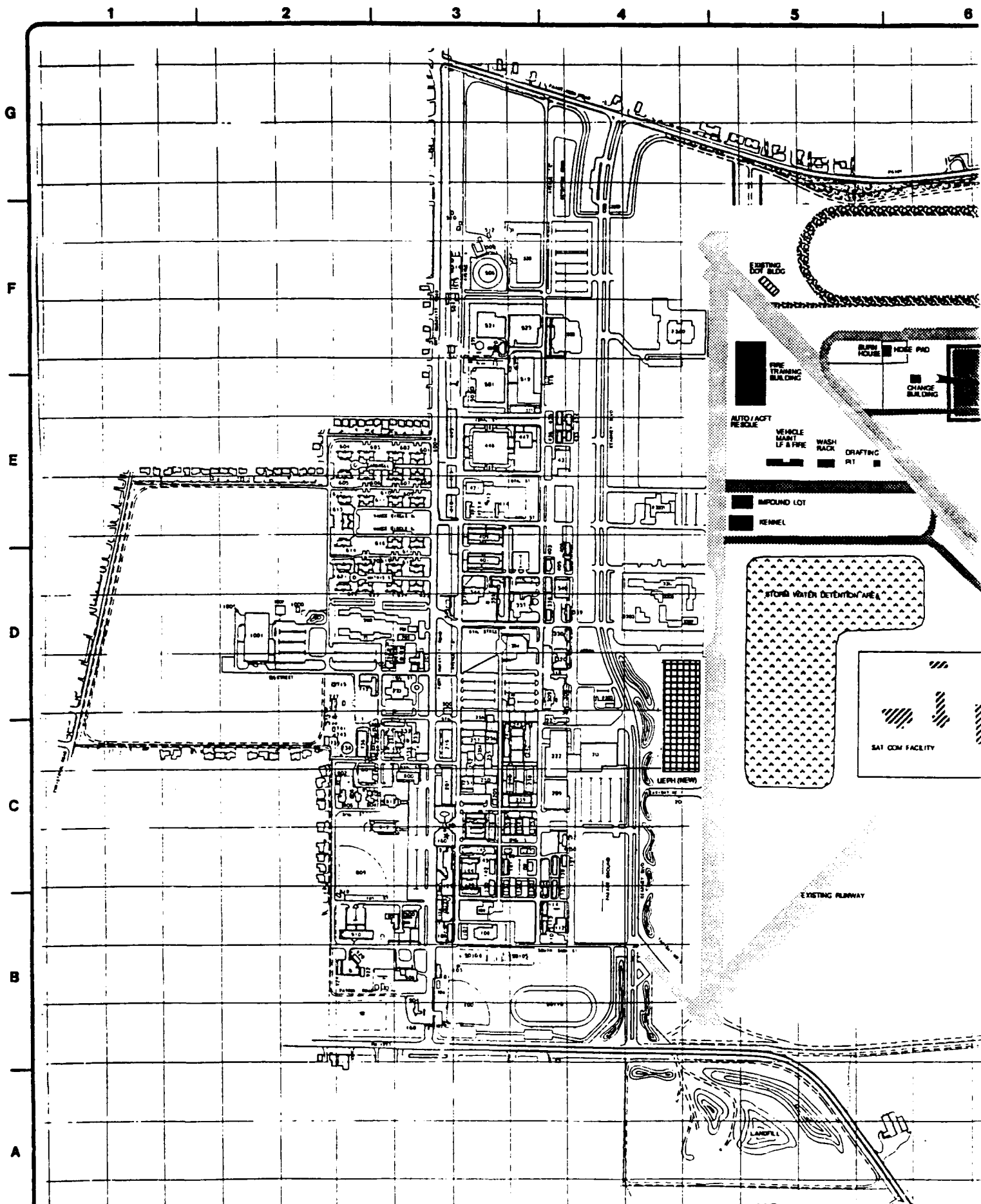
C. Alternative 1.

The Air Force has completed a Planning Assistance Team Report for locating the incoming training facilities at Gooch AFB. This study also included siting of a Satellite Communications Facility which is proposed for construction in the future, however, this facility's impacts will be discussed in a separate environmental document and therefore, will not be directly considered in this EA.

The locations of the future Satellite Communications Facility and the existing Explosive Storage Facility necessitate locating the fire training functions on the northern portion of the base. Because of potential smoke problems, the burn pits should be separated as far as possible both from the Satellite Communications Facility and the base perimeter. The best location for the fire fighting facilities are as close to the center of the eastern half of the base as possible without crossing clear zones for the Satellite Communications facility. However, this location is already in use by the Department of Transportation (DOT) tire test track. Due to the anticipated problems with the smoke, the existing access routes for traffic from the base, and internal traffic patterns for the fire training facilities, it would be most advantageous to relocate the DOT track to the northern edge of the base. This would serve the purpose of providing a visual and sound buffer for the fire training facilities. A line of shrubs and trees will be planted along the base fence line to further buffer the area (figure II-2).

The facilities to be constructed include three associated yet distinctly different functional areas. The vehicle maintenance and fire fighting activities would be located at the extreme western portion of available area, and the fire training activities would be located in the middle of the area. The liquid oxygen (LOX) and fuels activities would be sited in the southern and south eastern portion.

The proposed burn pits would be placed at the center of the fire training facility to maximize efficiency and minimize the impact on the adjacent functional areas. The hazardous materials training area would work well in its location because it would allow the Air Force to minimize the required total acreage within an already defined traffic loop (the existing DOT tract).

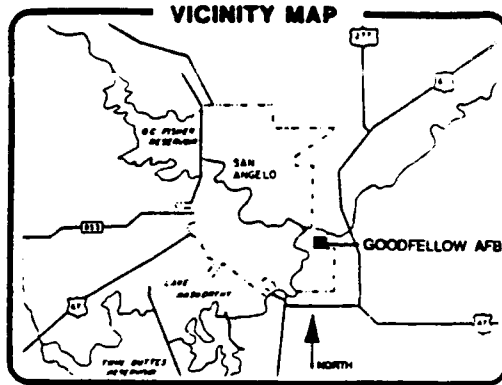
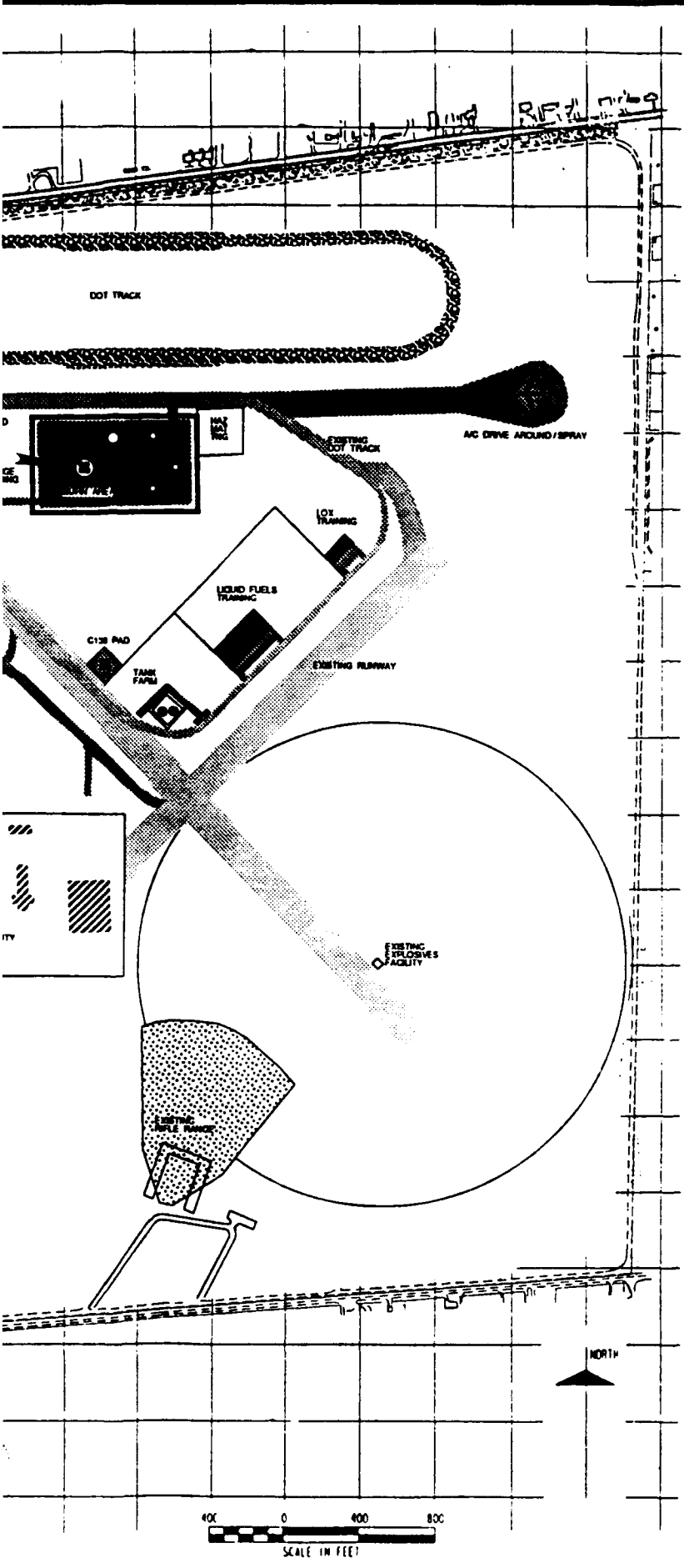


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8



LEGEND

- EXISTING RUNWAYS
- EXISTING DEPARTMENT OF TRANSPORTATION (DOT) TRACK
- PROPOSED BUILDINGS FOR FUEL HANDLING AND FIRE FIGHTING
- PROPOSED ROADS FOR FUEL HANDLING AND FIRE FIGHTING
- PROPOSED UNACCOMPANIED ENLISTED PERSONNEL HOUSING AND SERVICE FACILITIES
- PROPOSED SATELLITE COMMUNICATIONS FACILITIES (SAT COM)
- PROPOSED DEPARTMENT OF TRANSPORTATION TRACK
- PROPOSED BERMS AND LANDSCAPING

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U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

GOODFELLOW AIR FORCE BASE
SAN ANGELO, TEXAS

**FACILITY LOCATIONS
ALTERNATIVE NO. 1**

SHEET 1 OF 1

FIGURE 11-2

The fire truck acceleration distance required for the aircraft approach and spray down facility is suited for placement at the northern portion of the existing DOT track. In addition this location allows the Air Force to keep the rapidly moving (40 MPH) 33 ton trucks from conflicting with smaller vehicle traffic patterns within the training facility.

The Liquid Oxygen facility would be at the southeastern portion of the DOT track to maximize internal traffic patterns. In addition the LOX facility is in operation 24 hours a day and it produces a significant amount of noise. The recommended location will allow the Air Force to keep the facility from becoming an irritant to the base population and the community.

The liquid fuels training area and classrooms would be located adjacent to the LOX facility in order to allow LOX administrative support to retain sufficient control. Additionally classrooms for liquid fuels and the refueling hydrant training would occur in the open area immediately behind the building.

The fuel storage facility was located at the southern apex of the DOT track to maintain span of control with the liquid fuels area. The fuel storage facility should be located as far as possible from the burn pits while remaining within site limitations.

The C-130 training pad was located at the edge of the fuel storage facility in order to eliminate conflicts between fire fighting and fuel activities. Those activities that occur at the vehicles approach and hose area and refueling area can not efficiently operate on the same roadway at the same time because of the different vehicles being used and the rate of speed at which they must operate.

The maintenance and training compound serves several functions. The drafting pit, that simulates drawing water out of a surface reservoir, is used to fill the fire fighting vehicles for training exercises. The wash racks would be placed at the southern portion of this area in order to facilitate easy access of all types of vehicles without conflicting with the internal traffic patterns of the maintenance and training compound. The vehicles maintenance facilities for the fire fighting equipment and the fuels maintenance equipment would be combined to maximize efficiency and minimize redundant aspects of the building. It should be noted that, due to functional requirements, fire fighting and fuels maintenance are placed on opposite ends of the

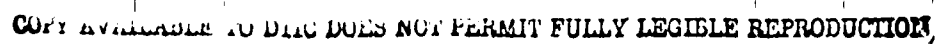
building with a fire wall separation. The rescue training area would be located immediately west of the vehicles maintenance area for easy access of emergency vehicles. In addition, class rooms required for the training are located immediately north in the fire training facility building. The building was located at the extreme north western portion of the site adjacent to the existing ramp to allow the ramp to be used for additional parking and to link it to the rest of the base.

The hose pad would be located east of the fire training building. The students will work in the training building and burn pit immediately to the east of the hose pad during exercises. By locating the hose pad in between the two activities it would allow the students to walk only a short distance to practice hand lines activities. Also located in this area is the burn house which would be used for structural fire fighting training.

The change facility would be located immediately west of the burn pits and east of the hose pad. This building is used by the students to don their fire fighting clothing. This gives the students ready access to the burn pit and the hose pad activities.

D. Alternative 2.

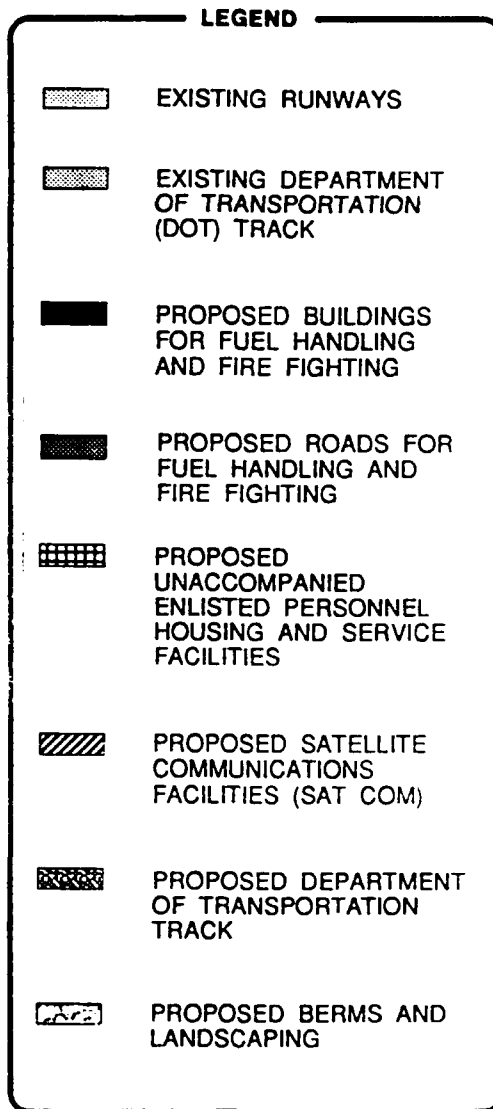
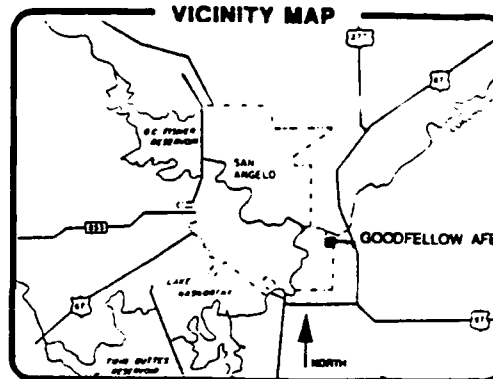
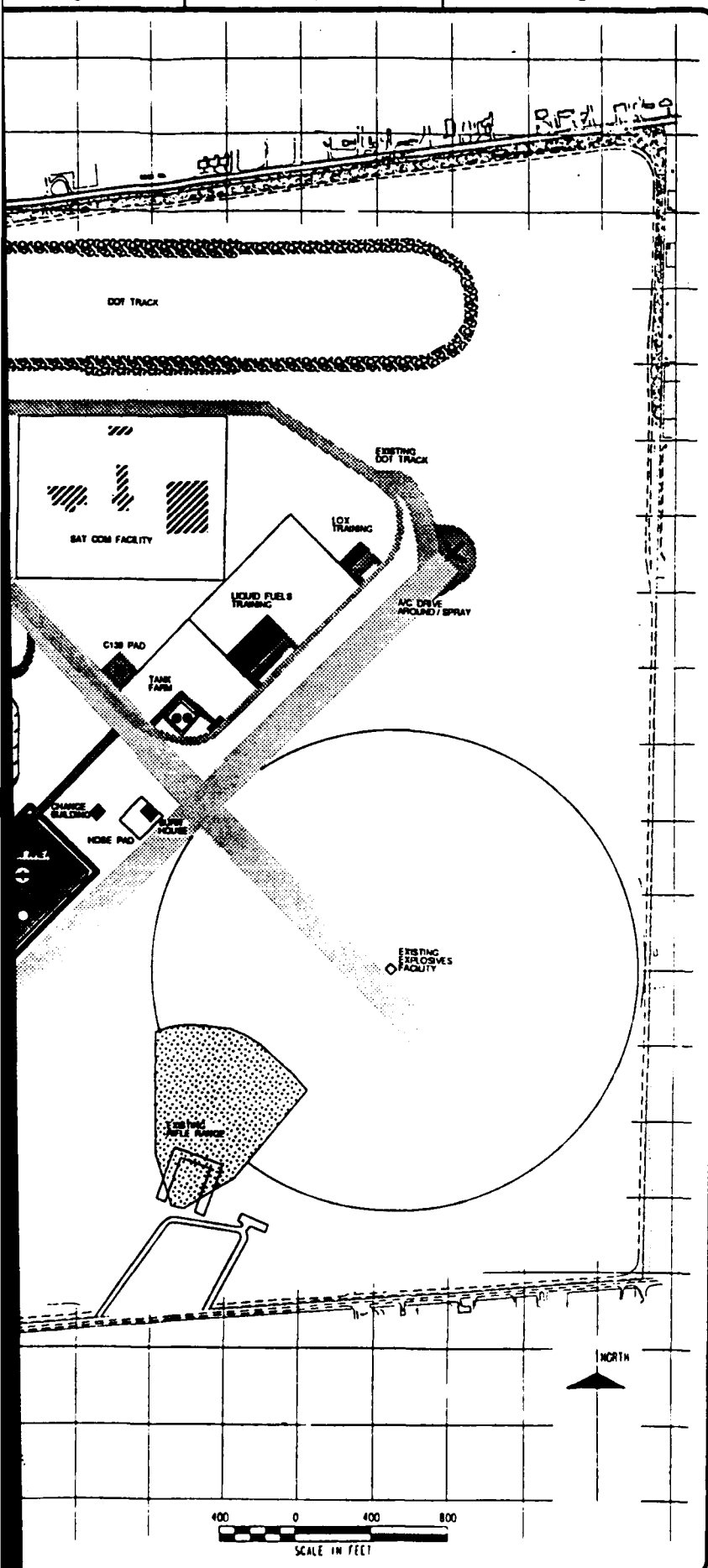
This proposed alternative would allow the DOT Track, Kennel, impound lot, fuel training area and existing explosives facility to remain in their current location, while the future Satellite Communications Facility would be moved to the north just south of the DOT Track (Figure II-3) which is located on the northern portion of the base. The burn pits would be located south and west of the intersection of the the two runways. This would provide a greater visual buffer distance from the residential area which is located immediately adjacent to the northern boundary of the base. This would allow the fire fighting training facility to utilize the existing northeast-southwest runway while enroute to the drive around spray, which would be located at the northeast end of the northeast-southwest runway. The fire training building, drafting pit, wash rack, and vehicle maintenance building would be located just southeast and adjacent to the burn area. A line of shrubs and trees will be planted along the northern base fence line to further buffer the area from the residential area. This would serve the purpose of providing a visual and sound buffer for the fuel and fire training facilities.



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U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

GOODFELLOW AIR FORCE BASE
SAN ANGELO, TEXAS

**FACILITY LOCATIONS
ALTERNATIVE NO. 2**

SHEET 1 OF 1 FIGURE 11-3

The fire truck acceleration distance required for the aircraft approach and spray down facility may not be suited for placement at the end of the northeastern-southwestern runway, because this placement may cause conflicts with smaller vehicle traffic patterns at the fuel training facility. Those activities that occur at the vehicles approach and hose area and refueling area can not efficiently operate on the same roadway at the same time because of the different vehicles being used and the rate of speed at which they must operate.

The Liquid Oxygen facility would be at the south portion of the fuel training facility maximize internal traffic patterns. In addition the LOX facility is in operation 24 hours a day and it produces noise. This proposed location will allow the Air Force to keep the facility from becoming a noise problem to the base population and the community.

The fuel storage facility would be located at the southern apex of the fuel training area. This location could be in conflict with the burn pit since the fuel storage facility should be located as far as possible from the burn pits while remaining within site limitations.

E. Alternative 3.

This alternative involves locating both the fuel and fire fighting training facilities off-base, which would require the purchase of additional real estate. The property purchased should be located in an area that is isolated from industrial and residential areas and preferably in an area that is scarce in vegetation. This would reduce the visual (psychological) impacts of the smoke plumes which are associated with the fire fighting training. This would allow the SATCOM facility to be constructed on-base without any interference from the fuel and fire fighting training facilities. Also the DOT track could remain in it's present location which would eliminate construction costs.

However there are significant negative impacts associated with this alternative. this alternative would require additional expense to the Air Force for land purchase and utility construction. For example, this alternative would require construction of potable drinking water facilities and a change building with showers, dining facilities, and additional land acquisition. Since the area would be somewhat isolated, there would be a need for a security system. An off site alternative would require that students be

transported to and from the remote facilities increases transportation costs and decreases training efficiency. Finally, in the case of an emergency there would be no immediate access to medical facilities.

III. AFFECTED ENVIRONMENT

A. Climate.

The climate of the area varies from humid subtropical, when southerly winds prevail, to semiarid, when westerly or northerly winds prevail. The area experiences generally hot summers and dry, mild to cold winters. Average monthly rainfall ranges from 0.97 inches in December to 2.84 inches in May, with annual average precipitation of 21.9 inches. Snowfalls in the amount of 1 inch (2.5 cm) occur only about once a year. Heavy snowfall for this region does occasionally occur (5.8 inches fell in a 24-hour period in November 1968). Sleet occurs about as often as snow; amounts and duration are generally small. The average annual wind speed is 9.9 mph, with the most frequent winds coming from the south. The average net evaporation for the area is approximately 45 inches (3.8 feet) per year based on 67 inches average annual evaporation and 22 inches average annual precipitation.

B. Soils.

According to the U.S. Department of Agriculture (USDA) Tom Green, County, Texas, Soil Survey, the primary association encountered in central Tom Green County is the Kimbrough-Mereta-Angelo association. The association consist of very shallow, shallow, and deep, nearly level to sloping and undulating, calcareous soils on outwash plains. The specific soil types encountered within the project area are: Angelo clay loam (AnA), Kimbrough, undulating (KmC), and Mereta clay loam (MeA).

C. Geology.

The primary materials underlying San Angelo are of Permian age and consist of the San Angelo Sandstone underlain by the Choza formation. The Permian beds dip to the west at approximately 50 feet per mile. To the north, west, and south at distances of 5 to 10 miles, San Angelo is surrounded by Cretaceous erosional remnants which typify the Edwards Plateau area. These formations unconformably overlie the Permian beds and dip to the east.

Surface materials consist predominantly of thick, reddish-brown clay overburden of mostly low to medium plasticity, with caliche and sand. This material ranges from 15 to 20 feet in thickness. A weakly cemented conglomerate or gravel layer is usually encountered below the clay blanket. This formation, of Quaternary age consists of hard rounded to sub angular, limestone and chert modules in a limy clay and sand matrix. Cementation is usually calcareous. When encountered, the conglomerate varied from 10 to 20 feet in thickness.

D. Biological Resources.

1. General

The natural vegetation of Goodfellow AFB includes species of the Rolling Plains mixed or short grass prairie and is heavily influenced by forb (non-woody) species, particularly in areas of local disturbance. All of the vegetation on the base is mowed as a fire protection measure, with the exception of the areas around the runways which have not been maintained. Native grasses and mesquite trees have emerged as a result of the lack of maintenance of the runway areas.

2. Plants

Grasses include big, little, sand and silver bluestems, Texas wintergrass, indiagrass, switchgrass, sideoats and blue gramas, wildryes, tobosa and buffalograss on the clay soils. The sandy soils support tall bunchgrasses, mainly sand bluestem. Sand shinnery oak, sand sagebrush and mesquite are the dominant woody plants. The study area at Goodfellow AFB includes the above mentioned native grasses and forbs dotted with mesquite trees ranging from 3 to 6 feet tall. (Appendix A table II-1). The introduced and landscape vegetation species are not present in the 300 acre tract which is being studied

3. Animals

Common turtles may include the Texas slider, spiny softshell, and yellow mud turtle. The only terrestrial turtle in the area is the ubiquitous ornate box turtle which is a grassland inhabitant.

Snakes include the diamondback water snake, blotched water snake rough green snake, western hognose, western coachwhip, Texas night snake, prairie rattlesnake, western diamondback rattlesnake, racer, bullsnake, great plains rat snake, and desert kingsnake. Lizards include the collared lizard, Texas horned lizard, eastern tree lizard, Great Plains skink, ground skink, prairie racerunner, southern prairie lizard, Texas spiny lizard, and spotted whiptail. Frogs and toads found in the area include plains leopard frog, chorus frog, cricket frog, woodhouse's toad, western spadefoot, and Couch's spadefoot toad. (Appendix A Table II-2).

Birds common to the area (mesquite rangeland) are the cactus wren, Bell's vireo, Bewick's wren, scaled quail, bobwhite, horned lark, eastern meadowlark, and western meadowlark. Other species expected to be common breeding birds in the area include the turkey vulture, Mississippi kite, red-tailed hawk, Swainson's hawk, killdeer, common nighthawk, morning dove, hummingbird, roadrunner, scissortailed flycatcher, ash-throated flycatcher, ladder-backed woodpecker, mockingbird, red-winged blackbird, brown-headed cowbird, and cardinal. (Appendix A Table II-3).

Mammals of this area include the badger, black-tailed prairie dog, plains harvest mouse, pallid bat, ringtail, hog-nosed skunk, white-ankled mouse, opossum, fox squirrel, eastern cottontail, hispid pocket mouse, Merriam pocket mouse, hispid cotton rat, black-tailed jackrabbit, and white tailed deer. (Appendix A Table II-4).

No fish habitat is present on the project site. The closest habitat is the Concho River, located about a mile to the west of Goodfellow AFB.

The U.S. Fish and Wildlife Service's latest published version of threatened and endangered species was consulted to identify those plants and animals listed or proposed for listing which may occur in the project area. The proposed facilities will be located about a mile away from the habitat of the Concho Water Snake (Nerodia harteri paucimaculata) which has been listed as being a threatened species (U.S. Fish and Wildlife, 1987). Verbal communication with the Fort Worth U.S. Fish and Wildlife Ecological Services Office indicates that the habitat that is indigenous to the Concho water snake is not present at Goodfellow AFB. (Appendix A Table II-5).

Also, a check of the Texas Parks and Wildlife Department's list of threatened and endangered species for Tom Green County was consulted. The endangered species includes the bald eagle, Peregrine falcon, Concho water snake, and the Texas horned lizard. There was no listed threatened species. (Appendix A Table II-6). These species are not expected to be impacted by the transfer of facilities to Goodfellow AFB.

E. Water Resources.

San Angelo receives most of its water from the proposed Stacy Reservoir, O. C. Fisher Lake, Twin Buttes Reservoir, and Lake Nasworthy, since the groundwater resources are not abundant and are of poor quality. The most dependable sources of ground water supply in the county are the Quaternary deposits which reportedly yield up to 500 gallons per minute and the Bullwagon Dolomite member of the Vale formation which reportedly yields up to 1000 gpm. The Bullwagon Dolomite crops out in eastern Tom Green County and is the uppermost member of the Vale formation which directly underlies the Choza formation. Measured ground water levels range from 18 to about 34 feet in depth below the ground surface. A supplemental water supply to relieve future shortages is, however, being developed in the Hickory Sandstone Aquifer about 60 miles southeast of San Angelo. The city water treatment plant capacity in 1979 was 30 MGD per day. Annual average daily water consumption is about 10 million gallons per day, of which Goodfellow uses 0.2 MGD, or approximately 2 percent. In addition to the city water, Goodfellow AFB has a permit from the State of Texas authorizing diversion of water from the Concho River to an on-base storage reservoir. This water is nonpotable and is used for irrigation. Total yearly diversion is not to exceed 27.7 million gallons.

Wastewater in the San Angelo area is treated by an 8.3 MGD activated sludge Waste Water Treatment Plant (WWTP). The 208 wastewater study has indicated that no immediate expansions of this facility are necessary. Goodfellow is tied into this system and contributes 0.195 MGD, or about 3 percent of the average daily flow of 6.5 MGD.

San Angelo has been issued a permit (no. 10641) by the state of Texas to operate the treatment plant. Effluent limitations imposed by the permit are being met. All treated wastewater is used for irrigation of landscape vegetation and grasses on base and therefore does not affect downstream uses.

F. Air Quality.

The San Angelo/Tom Green County area is in compliance with all applicable National Ambient Air Quality Standards (NAAQS). Dry conditions together with periods of high winds have contributed to periods of high particulate values in West Texas. These levels were disregarded with respect to nonattainment of the NAAQS since they were attributed to dust storms (U.S. EPA 1978). Air pollution episodes have not occurred in the San Angelo area. Goodfellow is currently in compliance with all state and Federal air emission standards. There are currently no major pollutant sources on base, and natural gas, a relatively clean fuel, is the primary fuel source for heating.

G. Noise.

Goodfellow AFB is located in an urban setting. The major noise sources at Goodfellow AFB are automobile and truck operations on the streets running through Goodfellow AFB, the small arms firing range club, and the "motor pool" where all military vehicles are serviced, stored, and repaired. However, these effects are localized and do not have a significant adverse effect on the surrounding area.

H. Recreation.

Goodfellow AFB provides recreation opportunities for their personnel at the installation and at Goodfellow Recreation Camp located nearby at Lake Nasworthy. Facilities at the Recreation Camp include one softball field, one playground, boat dock slip rentals, boat rentals, one hardsurface multipurpose court, three group pavilions and 6 RV camping sites, and 9 picnic shelters. Recreation facilities at the base include two softball fields, running track, rifle range, gymnasium, pool, indoor physical fitness center, outdoor obstacle course, soccer/football field, gymnasium/fitness center, tennis courts, outdoor basketball court, 2 swimming pools, theater, bowling alley, 6 picnic shelters, arts/crafts/hobby shop, recreation center, and playground.

Additional facilities being programmed for construction at the Goodfellow Recreation Camp to meet existing needs include 15 picnic shelters, restaurant, swimming pool with change facilities, volleyball courts, 18 boat slips, 11 multi-use camping sites and a

special events plaza. Additional programmed recreation facilities at the base include three softball fields, a 350 yard golf driving range, bathhouse and swimming pool, youth centers, gymnasium, and student activity centers.

A number of parks, reservoirs, and lakes, provided by the City of San Angelo, Tom Green County and Corps of Engineers, offer recreation opportunities for private and military users. Three lakes and 38 parks, within 12 miles of Goodfellow AFB, provide 293 campsites, 285 picnic sites, 23 boat ramps, 3 swimming pools, 12 playgrounds and over 10 softball and hardsurfaced courts.

I. Aesthetics.

Goodfellow AFB is located in a broad flat plains region covering the central portion of the county. This plains area, extending eastward from San Angelo and south of the Concho River is known as the Lipan Flat. The area where the training and burning facilities are to be built is characteristic of this Lipan Flat region. This area slopes to the north at 0-2 percent. Fuel handling and burning facilities will be located at the northern end of a 600 acre open grassland area. Most of this 600 acre open area is composed of unmowed native grasses and scattered young mesquite trees.

Residential single family and multi-family housing are located north and east of the site and base development west of the site. Those residences which border the site to the east have unrestricted foreground and middleground views of the prairie and background views of the DOT building and other installation development. Most of the residences to the north have unrestricted foreground and middleground views of the site and unrestricted middleground and background views of the base buildings. The residential area to the north is separated from the installation by farm to market road 388. Those residences in the vicinity of the northern boundary drainage ditch have unrestricted foreground views, and limited middleground views to the site. Installation maintenance buildings which border the site on the west have unrestricted foreground, middle ground and background views of the site.

J. Socioeconomics.

The city of San Angelo is located in the Concho Valley of west-central Texas in Tom Green County. It is located 131 miles east of Odessa, 92 miles south-southwest of Abilene, 200 miles northwest of San Antonio and 224 miles west northwest of Austin. Goodfellow AFB is bounded by three highways and a farm road: Hwy 67 to the northwest, Hwy 87 to the north, Hwy 277 to the east and FM 2335 to the south. The entire installation encompasses approximately 1,137 acres of land in the southeast portion of San Angelo.

The city of San Angelo extends over an area of approximately 21,000 acres and represents only 2 percent of the 969,490 acres in Tom Green County. Vacant and agricultural lands predominate the city's total acreage. Commercial development is centered in the downtown area and along the major traffic corridors radiating from downtown. The major industrial area is located near North Bell Street and the railroad tracks. Residential development is scattered throughout the city. Singly family dwellings are most common. Two-family homes are located in older sections of the city, while multi-family dwellings are concentrated along of near major streets.

According to 1989 Census Bureau estimates, 100,107 persons reside in the county with about 85 percent or 85,400 living in the principal city of San Angelo (Table III-1). A summary of the historic and current population data for Tom Green County and the city of San Angelo is shown in table III-2.

As shown, population has increased steadily over the past 30 years, growing by 65 and 70 percent for Tom Green County and the City of San Angelo, respectively. The population in Tom Green County and the city of San Angelo grew by 65 and 70 percent, respectively, between 1960 and 1989. The median age of Tom Green County is 28.9 years, close to the 29.2 median age for the state. About 70 percent of the population is over age 18 and 52 percent of the population is female. Of the population over the age of 15, approximately 30 percent are now married.

Table III-1 also displays the population for both the county and city according to census tract. Census tracts 1 through 17 represent Tom Green County, while 1 through 15

TABLE III-1

**CENSUS OF POPULATION AND HOUSING
FOR TOM GREEN COUNTY
AND THE CITY OF SAN ANGELO**

PLACE	1960	1970	1980	1989a
Tom Green County	64,630	71,047	84,784	100,107
San Angelo	59,374	64,793	70,726	85,400

TABLE III-2**HISTORIC AND 1989 CENSUS OF POPULATION AND HOUSING
FOR TOM GREEN COUNTY AND SAN ANGELO**

TRACT	1960	1970	1980	1989e
1	1,215	1,815	2,035	3,261
2	2,673	2,964	3,555	4,355
3	2,840	3,253	3,127	4,292
4	6,935	7,126	6,449	7,609
5	2,909	1,968	2,135	2,201
6	1,840	1,343	1,354	1,394
7	4,186	3,606	4,519	4,654
8	4,313	6,191	6,360	7,989
9	3,770	3,266	3,201	3,628
10	6,656	5,826	5,378	5,561
11	7,340	7,751	7,535	8,206
12	4,098	6,379	7,261	8,274
13.1	2,539	4,303	6,627	7,322
13.2	2,343	3,972	6,106	8,752
14	3,924	3,105	3,125	5,554
15	1,766	1,925	1,959	2,348
16	2,858	2,338	3,274	2,827
17	2,425	3,916	10,784	11,880
Total	64,630	71,047	84,784	100,107

Source: 1989 Census of Population and Housing

represent the San Angelo portion. Figure III-1 displays a map of the census tract areas. The largest recent growth shows a 78 percent increase in population between 1980 and 1989 which occurred in census tract 14, located just west of the installation. Goodfellow AFB is located in census tract 15 and experienced a 17 percent growth rate during the same time period. Census tract 8, which completely surrounds Goodfellow experienced a 25 percent growth rate between 1980 and 1989.

Government expenditures account for a significant portion of the Tom Green County economy. Total 1986 Federal expenditures in the county were about \$262 million. In Fiscal Year 1988 the combined military and civilian personnel payroll for Goodfellow AFB totaled over \$77 million, and an additional \$33.5 million was paid to retirees who reside within a 50 mile radius of Goodfellow AFB. Local procurement of supplies, equipment, and construction work totaled over \$84 million in FY88, with over \$46 million or 55 percent flowing into San Angelo and Tom Green County. Agriculture is another important factor in the area's economy. Annual farm income in 1982 for the county totaled about \$65 million for the county with \$45 million or 73 percent from livestock and poultry production. San Angelo has been recognized as the "Sheep and Wool Capital" of the nation. It is the nation's largest wool market and a leading center for producing, processing and shipping wool and mohair.

San Angelo also has a variety of agribusinesses, livestock feeding operations, fish hatcheries, packing centers, and plants to make sportswear, footwear, surgical supplies, millwork, aircraft parts, oilfield equipment, and many other products.

Full-time employment by key industries for 1985 and 1986 in Tom Green County is shown in table III-3. For both years Tom Green County mirrors the state with over 58 percent of the local employment occurring in three key industries: government, retail trade, and services.

Table III-4 displays aggregate full-time and part-time employment for all industries in Tom Green County. The table shows an increase in overall employment over the 1984 to 1986 time period. The May 1989 unadjusted unemployment rate for San Angelo was 5.2 percent which is slightly lower than the 5.9 percent rate for the state of Texas. The Bureau of Labor Statistics reported the 1987 and 1988 annual average unemployment rate for Tom Green County as 6.3 and 5.94 percent, respectively. These figures are

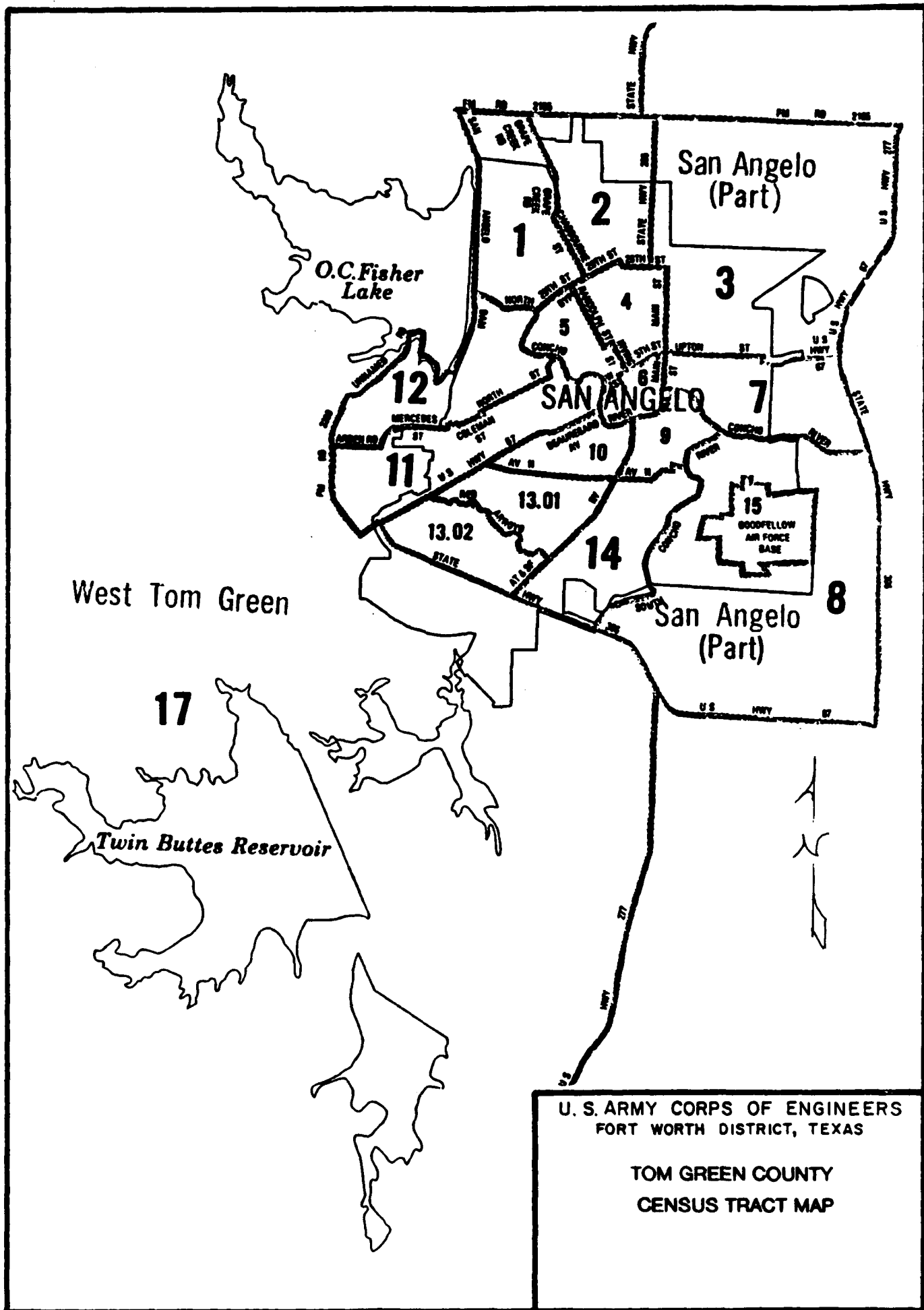


TABLE III-3**EMPLOYMENT BY KEY INDUSTRY
FOR TOM GREEN COUNTY**

Key Industry	1985	1986
	Employment	
Farm Workers (BEA)	1,323	1,202
Ag Services, Forestry, Fishing & Other	152	122
Mining	1,358	1,161
Contract Construction	2,175	2,109
Manufacturing	5,324	5,571
Transportation & other Public Utilities	3,584	3,602
Wholesale Trade	1,960	2,259
Retail Trade	8,705	8,145
Finance, Insurance, and Real Estate	2,000	1,936
Services	7,214	7,616
Government (BEA)	8,974	9,499
Total	42,769	43,222

**Source: National Planning Data Corp., County Business Patterns,
1985, BEA**

TABLE III-4

**TOTAL FULL-TIME AND PART-TIME EMPLOYMENT
FOR TOM GREEN COUNTY**

Industry	1984	1985	1986
Employment	51,926	52,267	52,331
Wage and Salary Employment	43,132	42,960	42,404
Proprietors	8,794	9,307	9,927
Farm Proprietors	891	842	761
Non-Farm Proprietors	7,903	8,465	9,166
Farm	1,394	1,323	1,202
Non-Farm	50,532	50,944	51,129
Private	41,496	41,970	41,630
Ag Serv., For., Fish., & Other	365	377	369
Mining	2,320	2,435	2,361
Construction	3,512	3,336	3,182
Manufacturing	6,005	5,892	5,870
Transportation & Public Utilities	4,091	3,904	3,595
Wholesale Trade	1,474	1,564	1,619
Retail Trade	9,288	9,316	9,106
Finance, Insur. & Real Est.	3,117	3,409	3,457
Services	11,324	11,737	12,071
Govt. and Govt. Enterprises	9,036	8,974	9,499
Federal, Civilian	931	938	933
Military	2,582	2,467	2,981
State & Local	5,523	5,569	5,585

Source: BEA, Regional Economic Information System, April 1988

lower than the state average of 8.4 percent in 1987 and 7.3 percent in 1988. Unemployment estimates for the first quarter of 1989 by the Bureau of Labor Statistics show Tom Green County remaining below 6 percent, less than Texas' average of around 7 percent.

As of June 1989 Goodfellow employed a total of 3,843 persons consisting of approximately 1,950 active military personnel, 1,300 civilian personnel, 638 contract civilians, and an average daily student load of 2,100.

Historic and 1989 estimated per capita income for Tom Green County and the State of Texas is presented in table III-5. Per Capita Income for the county has increasingly (from 5 to 7 percent) lagged behind the state over the 30 year period.

Table III-6 shows historical and 1989 average household income for the county and state. The figures show Tom Green County below the state with a difference of around 9 percent.

Housing characteristics reported by the Census Bureau in 1980 for Tom Green County, San Angelo, and the State of Texas are shown in table III-7. The table III-7 also shows that the percentage of single-family and owner-occupied dwellings relative to total year-round housing units is above the state average. These figures also show the vacancy rate of both the county and the city for owner (1.4 percent) and renter-occupied (6.3 percent) units to be well below state vacancy rates of 2.5 and 10.9 percent, respectively. Approximately 87 percent of the total housing units in Tom Green County are urban and located in the city of San Angelo. In 1980, renters occupied over 30 percent of the housing units available for all three areas shown.

Between 1980 and 1986 building permits for new private housing units were authorized; about 20 percent of the 1980 housing stock.

According to 1988 figures provided by Goodfellow AFB, of the total 4,646 military personnel, 4,345 or about 94 percent of all military personnel reside off-post. There are only 96 sets of family quarters for enlisted personnel, and waiting list for 280 enlisted personnel and 7 officer on-post housing units currently exists.

TABLE III-5

**HISTORIC PER CAPITA INCOME FOR
TOM GREEN COUNTY AND
THE STATE OF TEXAS**

	1969	1979	1989e
Tom Green County	2,650	6,798	11,620
State of Texas	2,792	7,205	12,473

TABLE III-6

**HISTORIC AVERAGE HOUSEHOLD INCOME FOR
TOM GREEN COUNTY AND
THE STATE OF TEXAS**

	1969	1979	1989e
Tom Green County	8,068	18,652	31,694
State of Texas	8,965	20,550	34,841

Source: 1989 Census of Housing and Population

TABLE III-7

**SELECTED HOUSING DATA
FOR TOM GREEN COUNTY, SAN ANGELO
AND THE STATE OF TEXAS**

Tom Green County, San Angelo, Texas

	Number	%	Number	%	Number	%
Total Housing Units*	32,599	100.0	28,306	100.0	5,480	100.0
Single Family	25,536	78.3	22,176	78.3	4,143	75.6
Multi-Family	5,742	17.6	5,529	19.5	1,337	24.4
Mobile Homes	1,221	3.7	601	2.1	N/A	0.0
Owner-Occupied	19,543	59.9	16,523	58.4	3,170	57.8
Renter-Occupied	10,826	33.2	10,053	35.5	1,760	32.1
Combined Vacancy	2,230	6.8	1,730	6.1	551	10.1
Owner Vacancy Rate		1.4		1.4		2.5
Renter Vacancy Rate		6.2		6.3		10.9
Median Value	31,000		31,000		39,100	
Persons per Unit		2.7		2.6		2.8

Source: 1980 Bureau of the Census

*Total housing units refers to available year-round units.

The area is served by a well developed transportation network with truck and rail freight service, and limited connections to air transportation. Major highways serving the area include: US Highways 87, 277, and 67; and State Highways 306 and 208. The San Angelo Transit Department operates a bus system, and commercial bus lines provide intercity transportation. Air travel is provided by Southwest Airlines and American Eagle Airlines and operates out of Mathis Field, and local non-passenger rail service is provided by the Santa Fe Railroad.

K. Toxic and Hazardous Materials Management.

In 1980 the United States Air Force (USAF) began implementing the Department of Defense (DOD) Installation Restoration Program (IRP). The IRP is designed to identify and fully evaluate suspected problems associated with past hazardous waste contamination, and to control hazards to health and welfare resulting from past operations. Goodfellow is not on the Environmental Protection Agency National Priorities List. Regulatory oversight is provided by the Texas Water Commission. The first hazardous waste investigation activity under the IRP was conducted in 1985. A records search identified four potential disposal sites that required further study. A description of these sites are provided in Appendix B of this document.

L. Cultural Resources.

Cultural resources at Goodfellow AFB potentially could date to any time within the 12,000 years of human occupation recognized for this region of West Texas. In very general terms, this time span can be divided four stages which have both temporal and developmental connotations. These stages are:

Paleoindian	10,000 to 6,000 B.C.
Archaic	6,000 to A.D. 1000
Late Prehistoric	A.D. 1000 to Contact
Historic	post-Contact

While no intensive archeological survey has been conducted at Goodfellow A.F.B., several studies in the surrounding region are useful for identifying the kinds of cultural resources that could potentially be present. Prior to the construction of O.C. Fisher Lake, a survey identified 13 prehistoric archeological sites (Stephenson 1949), seven of which had been discovered by J. Charles Kelly during a 1946 study of the area. No excavations were carried out at these sites prior to their flooding. Much later, however, limited investigations were conducted at two sites at the lake (Mayer-Oakes 1977; Thoms 1979). One of these was a prehistoric lithic workshop associated with rock art. The second was apparently the remains of a historic lime kiln.

Prior to construction of Twin Buttes Reservoir, salvage excavations were carried out at site 41TG5 (Green 1961). The site was occupied during the late Archaic stage and contained a variety of lithic artifacts and burned rock features. A survey of an area along the South Concho River in Tom Green County recorded 49 prehistoric sites that, in combination, contained evidence of occupation from the late Paleoindian to the Late Prehistoric stage (Creel 1978). A number of site types were identified, including burned rock middens, lithic scatters with burned rock, and lithic procurement sites. Of particular interest is the distribution of these sites with respect to three defined microenvironments: riparian; flatlands; and uplands. Almost all of the major occupation site were in or adjacent to the riparian zone along the south Concho river. The uplands in the rolling limestone hills primarily contained sites associated with exploiting the

abundant chert outcrops there. Sites were rare in the flatlands zone, which was defined as outwash plains, where soils of the Angelo association are characteristic (Creel 1978:259). The relative lack of resources important to prehistoric peoples made these flatlands much less attractive than the two other zones.

Although no intensive cultural resource surveys have been conducted for Goodfellow AFB, the installation's Historic Preservation Plan has identified three properties which may be of historical interest. These properties include two aircraft hanger structures that were constructed in 1943, and are architecturally unique for the base. Neither structure is considered eligible for the National Register of Historic Places. A 1980 study by the Air Force Regional Civil Engineer indicated that while the architectural style is unique for the base, it is not uncommon at other bases in the region.

The third property consists of the original gateposts of the entrance to a major ranch that was present when the installation lands were obtained by the Government in 1940. This property is located on Ft. McKavitt Road, in front of Building 734. Although the gateposts probably date to the early 1900's and are of local historical interest, they are not considered eligible for the National Register. Because of the gate's location near the center of the Cantonment area, it is likely that any associated homestead probably has been destroyed by facilities construction.

No historic or prehistoric archeological sites have been identified at Goodfellow AFB. However, any land surfaces that have not been heavily disturbed by the construction of base facilities have a potential for such sites. Based on previous work in the region, prehistoric site density is expected to be minimal within the confines of the base. The geographic situation and soil types of the base indicate that the outwash plain in this location is equivalent to the flatlands microenvironment identified by Creel (1978) as containing relatively few significant sites. Areas in the far north and west portions of the base which are closer to the river may have a somewhat greater potential for prehistoric sites. Any undisturbed areas of the base could also contain historic sites related to ranching activities that occurred prior to government acquisition. An intensive survey is needed before a reliable inventory of cultural resources can be made.

IV. ENVIRONMENTAL CONSEQUENCES

A. General.

No adverse impacts on a national or international scale is expected to occur. The Base would remain a strategic element in the management of the Nation's Military role. It would also support fire fighting and fuel training services and facilities that are of national and international importance. Fair weather year-round also makes Goodfellow AFB an ideal training installation, drawing personnel from a wide region. No significant physical or biological impacts result from the ongoing mission and military activities at Goodfellow AFB and support installations.

B. Climate.

Construction and operation of the fire fighting and fuel training at any site would have no measurable impact on the local climate. The climate is not expected to be a concern since the overall region is suited for this type of training. There should be no significant adverse impacts on the climate as a result of these training activities.

C. Soils.

During the construction of Goodfellow AFB in the 1940's, the entire area was highly disturbed and the soils were moved around in order to construct the streets, buildings, runways, and etc. Since that time new facilities have been constructed which has caused additional disturbance of the soils. Soils in the fire fighting and fuel training areas will again have to be disturbed in order to construct these additional facilities. Due to previous disturbance of the soils, there should be no significant adverse soil impacts associated with the new construction, provided that erosion preventative measures are taken during the construction phase.

The operations involving the storage, handling and burning of fuel will present the potential for soil contamination as a result of inadvertent releases. This potential can

effectively be minimized by the incorporation of spill prevention measures into facility design and by careful adherence to operating procedures intended to minimize the probability of accidental releases. In the event of an accidental release, prompt action to contain and clean up the material will minimize the potential for soil contamination.

D. Biological Resources.

Prior to May 1975 when the base conducted pilot training and used the runways, the proposed fire fighting and fuel training area was mowed on a regular basis and therefore, provided very little habitat value for wildlife. During recent years this area has been allowed to revegetate naturally with invader species such as native grasses and mesquite trees. These species now provide a much more improved habitat for wildlife.

Construction of the proposed fire fighting and fuel training facilities would remove present vegetation and result in a direct loss of the existing habitats. However, the wildlife species which occupy this area are mobile and would migrate to other adjacent habitats. Therefore, there should be no significant adverse effects expected to occur to the wildlife species or their habitats.

Noises generated by construction equipment and power generators would be temporary and should cause any long term significant adverse effects to the wildlife species.

E. Water Quality.

A typical fire fighting training system includes a burn pit, an oil/water separator, and a wastewater holding basin.

The circular burn pit is commonly 100 ft in diameter and consists of the following layers (bottom to top): (1) a double liner consisting of two high-density polyethylene plastic sheets with a plastic mesh sandwiched between them for leak detection; (2) a 6-in layer of sand to protect the liners; (3) a filter fabric to separate the sand from the overlying coarse stone and prevent surface settling; and (4) a layer of graded, crushed stone to provide a non-slippery, stable surface for fire fighters to walk on during exercises. The burn pit is encircled by a vehicle maneuvering area.

During fire-fighting test activities, operators pump water into the pit to create a pool about one-eighth inch deep above the gravel. The JP-4 fuel is then pumped onto the surface of the water and ignited. When the fire fighters complete a training session, the burn pit contains a mixture of water, unburned fuel, soot particles, and fire extinguishing agent. This mixture is washed out of the pit by a "washout system" which flushes the pit with 150 gpm of water for a 10 minute cycle. This mixture goes to an oil/water separator, which has a liquid capacity of 8500 gal. Fuel recovered from the oil/water separator will be reused at a later time as fuel for fire-fighter training operations. The fire fighting training facility is designed to be a closed-loop system. This is accomplished by reusing the water to fight the fires with no release of the wastewater to the environment.

Based upon experience at the Texas A&M fire fighting facility, a certain of extinguishing agent will remain in the washout water producing a chemical oxygen demand. Treatment of this water will require the use of a series of holding ponds. A primary settling pond will initially hold effluent water from the oil/water separator. This pond will include microbial breakdown of residual extinguishing agent to facilitate the reareation process. Secondly, an aeration pond using mechanical aerators will be required to further reduce oxygen demand to levels acceptable for reuse in the closed loop system. Sizing and capacity of these treatment ponds will be based upon anticipated volumes, effective settling and reareation rates, and local climatic conditions. Consideration in design will also be given to the potential for spills or overflows during storm events.

New facilities will require water, sanitary sewer, storm sewer, and non-potable water for landscaping. Only the storm drainage and non-potable water currently exist in the training area. The fire training function, including vehicle washing, burn areas, and domestic use, will require approximately 21,000 gallons of water per day. After the fire training session is complete the fire should be reignited and all residual fuel being burned as completely as possible before the wash out system flushes the pit. Storm water run off will increase due to additional paved areas which will be required. Non-potable water will be needed for irrigation of the grasses and plant materials.

With the above mentioned facilities and method of training there should be no significant adverse effects on the water quality at the base.

F. Air Quality.

JP-4 fuel is used to power most Air Force jet aircraft and is, therefore, the fuel of choice for creating live-fire training environments. It is a complex blend of up to 300 different hydrocarbons. Each blend and lot can exhibit slightly different characteristics and be composed of varying concentrations of organic species depending on the geographic region of origin and distillation source. In addition, minor additives are included in JP-4 to control oxidation, inhibit corrosion, prevent icing, and protect metal fuel system components.

Procedures used to conduct fire fighter training influence the quantity of air pollutants released by at least six mechanisms: 1) evaporation during application of fuel to the burn basin prior to ignition, 2) initial ignition period when the fire builds to a maximum burn rate, 3) uncontrolled emission of combustion by-products from facilities not provided with air pollution controls, 4) emission of partially or incompletely combusted hydrocarbons, 5) post-burn evaporation of residual fuel, and 6) deposition of air transported polycyclic aromatic hydrocarbon (PAH) laden particulate matter.

Studies of air emissions or possible adverse environmental consequences of live-fire training at these facilities have been undertaken. Research conducted in 1974 by the USAF Weapons Laboratory at Albuquerque, New Mexico, showed that at least 1,000 pounds of air pollutants were produced per 1,000 pounds of JP-4 jet fuel burned in the open without air pollution controls (Haney and Ristau, 1973, p.16).

Presently, many states exempt or waive regulation of air emissions from fire fighter training facilities because they believe: 1) the benefit to society provided in terms of lives saved and property losses averted outweigh the adverse air pollution potential; 2) these facilities when viewed individually are generally not considered to be major stationary sources as defined by the Clean Air Act; 3) operators have voluntarily suspended burning industrial waste materials and solvents in training fires (AFR 92-1(C1), 1983, pp.19-20).

A site visit to the Brayton Fireman Training School, College Station, Texas, was conducted in September of 1989. The school is operated by the Texas Engineering Extension Service and has received national recognition in the training of fire fighters. This school is operated similar to the Chanute AFB fire fighting training school which is to be moved to Goodfellow AFB.

The Brayton fire fighting school is operated approximately 250 days a year and conducts various fire fighting classes which includes marine, industrial, and aircraft simulated fire fighting class training. The simulated burns can use up to 750 gallons of diesel fuel and/or gasoline per burn. These burns also produce huge plumes of black smoke and emit similar particulates and substances similar to those expected at the Air Force Training Simulations.

In 1979, six fire fighting training instructors and two maintenance employees were given complete health physicals to determine if the exposure to the smoke and training had any adverse effects on the health of these individuals. The test included blood analysis, chest x-rays, upper and lower gastrointestinal analysis, and urine analysis. At the time of testing these individuals had been employed by the fire fighting training school and had been exposed to the smoke and training for approximately 10 years. The results of the test were negative and revealed no adverse health effects to the individuals tested.

Based on these results, and on the information contained no significant adverse air quality impacts are predicted to result from the fire fighting training.

G. Recreation.

The use of the southern part of the base for athletic activities is compatible with the existing and planned facilities. The current location of the obstacle course in the southeast corner of the abandoned airfield and the perimeter running track will remain in current locations since they are not in conflict with the mission requirements and the current utilization of the adjacent sites.

Also the three additional softball diamonds, a flickerball field, and a golf driving range which is being planned to be located in the south west corner of the site are not conflictive with adjacent, existing or planned land uses or activities.

The number of recreation facilities which have been planned and programmed for development at Goodfellow AFB and Goodfellow Recreation Camp will be adequate to accommodate the addition of average daily student load of 499 personnel and a permanent employee addition of 287 personnel. Pressures on existing regional recreation facilities will not be significant.

H. Aesthetics.

Visual, Odor, Noise Impacts - The fire fighting function is "dirty" in terms of the smoke, soot, odor and noise it creates. The burning of large quantities (50-750 gallons) of JP-4 will produce large volumes of heavy black smoke.

As a result there will be some aesthetic impacts to the Goodfellow AFB and San Angelo communities. The exact placement of the burn facilities and the wind conditions at the time of the burn will have a great deal of bearing on the degree of impacts to those communities. The impacts will include the sight and smell of dense black smoke as well as the deposition of soot on buildings and vehicles. Additionally, the foam trucks and their diesel engines will be annoying; southerly and westerly wind conditions will aggravate the situation. When winds are from the south or west, smoke will drift toward nearby residences. Even with densely vegetated berms residents along the north boundary of the site residents along the north and east boundaries will be able to see smoke, and sense odor and noise from the burn pit activities.

To reduce reactions to fire fighting activities, Goodfellow AFB plans on establishing an outreach program to educate the surrounding community to the nature of the fire school burn pit operations and activities. Videos will be used to show actual fire fighting activities.

I. Socioeconomics.

The Economic Impact Forecast System (EIFS) was used to estimate the expected socioeconomic impacts associated with the proposed realignment at Goodfellow AFB. The realignment proposal was separated into three categories and analyzed using the appropriate EIFS model. The Standard and Training EIFS Models were utilized to forecast the economic impact of permanent and trainee personnel, respectively. Similarly, the EIFS Construction Model was used to determine the impact of the construction required to support the realignment.

The EIFS also generates an income multiplier for each county or region using county business patterns, industrial structure, and economic base data obtained from the Bureau of the Census. An income multiplier of 2.0955 was calculated for Tom Green County.

Information from the Headquarters Air Training Command of the Department of the Air Force was used to assess the impacts of moving the Fuels and Fire Training portions of the Chanute AFB to Goodfellow. The model inputs were based on the following information and assumptions:

- a) **Baseline Conditions-**
 - 1,950 Active Military
 - 1,300 Civilian
 - 2,100 Average Daily Student Load
 - 3,250 Total active Base Population
 - \$28,500 Average Military Salary
 - \$27,300 Average Civilian Salary
 - \$ 5,050 Estimated Annual Expenditures per person (Operating Budget divided by Base Population)
 - 37.5% spent locally

- b) **Proposed Actions-**
 - 229 Permanent Party Increase
 - 100% living off-post (assumption)
 - 499 Student Load Increase
 - 100% living on-post
 - 66 Civilian Personnel Increase

 - 25% expected to relocate
 - 75% from local area

- c) **Permanent Party Impact.**

Administrative, training and technical support for the Goodfellow AFB realignment will require an additional 229 military and 66 civilian personnel. To determine how much additional expenditures would be made by Goodfellow due to the base population increase, the estimated annual expenditure per person of \$5,050 applied to the total number of additional personnel (295) and multiplied by the 37.5 percent expected to be spent in the local economy.

Approximately \$558,700 in additional expenditures are expected to be made in the local economy. Table IV-1 shows the total EIFS Model forecast.

The increase in local expenditures coupled with the demand for goods and services by the additional personnel produced an increase in sales volume, employment, and income. An additional 40 direct jobs would be created due to the civilian job openings

not filled by relocating personnel, with approximately 340 indirect jobs being supported by the Goodfellow expansion. Of the total 295 persons at least 188 will be required to seek housing off-post. The increased housing demand will thereby lower the vacancy rate. These permanent residents will also increase the number of children in the local schools. Approximately \$233,000 in net government revenues are expected to be generated by this phase of the realignment.

d) Training Impact

The realignment is expected to increase the average daily student load by 499 students or about 24 percent. Based on plans for a 650 person enlisted dormitory targeted for the fuel and fire training mission, 100 percent of the students are assumed to be housed on-post. As calculated for the Standard EIFS model a total \$945,000 in additional expenditures by the base in the local economy was estimated for the 499 trainees. Table IV-2 details the training impact on forecast on the local economy.

The table shows increases in total sales volume of about 0.6 percent, local employment by 1.17 percent and income by 3.79 percent. Although trainees are not expected to seek off-base housing, the increased economic activity could increase the local population due to the increase in employment. These additional trainees will generate the greatest amount of total income (\$46.4 million), and annual net government revenues of about \$1.9 million in comparison to the construction and personnel portions of the realignment.

e) Construction Impact

The realignment proposal also included provisions for the construction of enlisted personnel dormitories, a dining facility, and two (2) training facilities. The total cost of construction for these facilities was estimated at \$41.3 million. The Construction

TABLE IV-1

STANDARD EIFS MODEL FORECAST FOR GOODFELLOW AFB REALIGNMENT

		Percent Increase
Income multiplier:	2.0955	
Change in local		
Sales volume Direct:	\$4,904,000	
Induced:	\$5,372,000	
Total:	\$10,276,000	(0.572%)
Employment Direct:	42	
Total:	382	(0.753%)
Income Direct:	\$555,000	
Total (place of work):	\$9,491,000	
Total (place of residence):	\$9,435,000	(0.770%)
Local population:	616	(0.675%)
Local off-base population:	474	
Number of school children:	131	
Demand for housing Rental:	116	
Owner occupied:	72	
Government expenditures.....:	\$323,000	
Government revenues:	\$556,000	
Net Government revenues:	\$233,000	
Civilian employees expected to relocate:	16	
Military employees expected to relocate:	229	

TABLE IV-2

TRAINING IMPACT FORECAST FOR GOODFELLOW AFB REALIGNMENT

		Percent Increase
Income multiplier:	2.0955	
Change in local		
Sales volume	Direct:	
	Induced:	
	Total:	(0.608%)
Employment	Direct:	
	Total:	(1.165%)
Income	Direct:	
	Total (place of work):	
	Total (place of residence):	(3.786%)
Local population		(1.361%)
Local off-base population		
Number of school children		
Demand for housing Rental:		
	Owner occupied:	
Government expenditures.....		
Government revenues		
Net Government revenues		
Civilian employees expected to relocate:		
Military employees expected to relocate:		

Impact Forecast in table IV-3, shows increases in total sales volume, employment and income of 2.12, 1.23, and 0.95 percent, respectively. The construction phase of the realignment will generate the greatest total sales volume (\$38.2) of the three phases, while net government revenues will only be about \$157,000.

f) Housing

Based on the limited 1980 to 1986 housing market data previously presented, increased housing demand is not expected to adversely affect the housing market. The San Angelo Independent School District is currently discussing plans to expand school campuses where necessary to accommodate the influx of students resulting from the *realignment of the fuel and fire fighting training schools*. Since vacant and agricultural lands predominate the city and surrounding area's total acreage, difficulties in acquiring land at a reasonable price should not be a problem.

The realignment of Goodfellow AFB is expected to have an impact in all sectors of the Tom Green County economy. An aggregate of the personnel, training and construction impacts is presented in Table IV-4. As shown an increase in total sales volume would increase employment, income, population, housing demand, and net government revenues in the local economy. However, this increase should be minimal and will not have a significant impact on the local economy.

Therefore, increased activity at the Goodfellow AFB will be beneficial to Tom Green County because additional military purchases of goods and services in the local community will help create secondary jobs and wages in the local economy.

J. Toxic and Hazardous Materials Management.

The Installation Restoration Program will not be affected by the realignment of the fuels and fire fighting training from Chanute AFB, Illinois to Goodfellow AFB, Texas.

TABLE IV-3

CONSTRUCTION IMPACT FORECAST FOR GOODFELLOW AFB REALIGNMENT

		Percent Increase
Income multiplier:	2.0955	
Change in local		
Sales volume	Direct: \$18,207,000	
	Induced: \$19,946,000	
	Total: \$38,153,000	(2.124%)
Employment	Direct: 154	
	Total: 623	(1.226%)
Income	Direct: \$2,059,000	
	Total (place of work): \$11,615,000	
	Total (place of residence): \$11,585,000	(0.946%)
Local population	0	(0.000%)
Local off-base population	0	
Number of school children	0	
Demand for housing Rental:	0	
	Owner occupied: 0	
Government expenditures.....	\$320,000	
Government revenues	\$478,000	
Net Government revenues	\$157,000	
Civilian employees expected to relocate:	0	
Military employees expected to relocate:	0	

TABLE IV-4

AGGREGATE IMPACTS OF GOODFELLOW AFB REALIGNMENT

Total change in local		Percent Increase
Sales volume	Direct:	\$28,326,000
	Induced:	\$31,031,000
	Total:	\$59,358,000 (3.304%)
Employment	Direct:	240
	Total:	1,597 (3.144%)
Income	Direct:	\$3,204,000
	Total (place of work):	\$36,564,000
	Total (place of residence):	\$67,404,000 (5.502%)
Local population		1,859 (2.036%)
Local off-base population		474
Number of school children		131
Demand for housing	Rental:	116
	Owner occupied:	72
Government expenditures.....		\$691,000
Government revenues		\$2,946,000
Net Government revenues		\$2,255,000
Civilian employees expected to relocate:		16
Military employees expected to relocate:		728

J. Cultural Resources.

If cultural resources are present in the areas of proposed land modification, then the proposed relocation may have an adverse impact on these resources. On the basis of current construction plans, none of the three properties of historical interest identified in the base's Historic Preservation Plan will be impacted. However, any ground disturbance associated with the construction of proposed facilities could be damaging to as yet unidentified archeological sites, should they exist. An inventory of cultural resources in the areas of proposed land modification is needed before the impacts to these resources can be determined.

On the basis of past disturbances, some areas can be excluded from consideration of cultural resources. This refers to areas where past ground disturbing activities would have damaged significantly the contexts of any existing archeological sites. The best example of this is the proposed location of the Unaccompanied Enlisted Personnel Housing (UEPH). Past construction of a detention pond at that location has essentially removed the potential for significant cultural resources. Similarly, those areas that were disturbed heavily by the construction of the runways and the existing DOT test track need not be surveyed for cultural resources. Although the potential for significant archeological sites at Goodfellow AFB is judged to be relatively low, a reliable cultural resources inventory is needed for all areas of proposed land modification that have not been disturbed significantly by previous base activities.

IV. MITIGATION MEASURES

The potential Environmental and Socioeconomic Impact of Goodfellow AFB in the performance of its mission is mitigated by a series of plans, programs and procedures which find application in the following environmental concerns:

A. Aesthetics.

In the arid climate of the San Angelo area, the selection of planting materials is limited. However, plantings and berms are a significant asset in increasing the aesthetic quality of the base. Efforts are continuing in constructing new berms. The base has developed a planting plan utilizing domestic low maintenance varieties of shrubs and trees. The use of sage, oleander, mountain cedar, eucalyptus and live oak is being recommended.

The troop walkway that has been developed on old Ave. B is a highly desirable aspect of the base. In addition, transverse links to the UEPH complex on the north side of 6th street and the south side of street accessing the commissary parking lot are needed. This will facilitate linking the UEPH facilities, parade ground, existing athletic field and the class room functions with a troop walkway without vehicle traffic conflicts. This will eliminate potential hazards for the marching troops. In order to maximize the quality of the troop walkway, it is also recommended that the walkway be planted with domestic shrubbery and trees. In addition utilization of sun shields, benches and lattices will greatly enhance the aesthetic quality of these spaces.

The Planning Assistance Team Study recommends installation of a berm and a dense landscaping belt along the north perimeter of the base. This would provide visual and acoustic buffering of the fire training school burn pits from the adjacent off-base community along this boundary.

There are several different types of buildings on base which present interesting aesthetic interactions. As indicated in the current Base Comprehensive Plan (BCP), Goodfellow AFB lacks a visual cohesiveness and organization due to the absence of a standardized architectural style. There are six predominate architectural styles on the base. They include wood frame, metal, three story brick dormitories, block shaped

masonry buildings, military family housing and WWII hangers. The attrition of the older wooden frame buildings has for the most part ameliorated the negative impact of their character on the overall base appearance. The Base Civil Engineering Comprehensive Planning Division has done a great deal of work already which has born excellent results. The AEG-3-41 recommendations for building shape, context, roof types, exterior fenestration and materials, paint colors, apertures and siting will result in an aesthetically coordinated base when implemented.

The buildings which have been constructed recently represent an excellent direction for the base to continue following. The new UEPH (buildings 3303-3307 & 3309-3311),

new commissary and base exchange buildings (buildings F222 & F223) represent well thought out and executed buildings. The architectural character of exterior building materials similar to these buildings should become the standard for the base. Care should be taken to ensure that new construction employs the same color of brick and types of standing seam metal roofs.

Planned earth berms along the northern perimeter will help reduce impacts to residential areas located along the north. The higher the berms the more effective they will be in screening flames, smoke, noise and odor. Berms will need to be taller in the areas of two story apartment complexes to be effective but can be lower in area where one story homes are located. Berms will provide immediate screening and buffering. Vegetation will be added to this berm to provide additional screening and aesthetics. The denser and taller the vegetation the more effective it will be in screening noise and tall smoke plumes. The vegetation will be irrigated to provide for fast growth rates and healthy plants.

Additional berms should be placed along eastern perimeter near residential areas to screen flames, smoke, noise and odor. Dense vegetative planting should also be used for additional screening, buffering, and aesthetics.

B. Recreation.

As a result of the transfer of the fuel and fire fighting training, plans have been made to construct additional baseball diamonds and a flickerball field. It is recommended that the new baseball and flicker ball fields be constructed on the site adjacent to the tennis courts (fac. 50105 and the existing ball field (fac. 100). It is also recommended that the existing non standard sized running track be relocated around the perimeter of the existing parade field which will permit construction of a much larger track. Additional parking should be constructed as needed in the extreme southwestern corner of the base in the field bordered by the base property lines on the south and the west, Patron Road on the north, and Fort McKavatt Road on the east. The recommended locations will not require the relocation of any existing or planned facilities.

C. Biological Resources.

Goodfellow has a Master Plan and a Landscape Management Program to maintain the character of the base. The Landscape Management Program has encouraged the survival of the native trees and vegetation, and has cultivated a variety of exotic vegetation. Some areas that were previously mowed have been allowed to grow haphazardly, which has effectively established wildlife breeding habitat for small mammals, birds, reptiles and amphibians.

D. Air Quality.

Executive Order 11752 states: "...it is the intent... that the Federal Government in the design, operation, and maintenance of its facilities shall provide leadership in the nationwide effort to protect and enhance the quality of our air and water resources" (AFR 1-2, 1982). Thus, USAF, an agency of the Executive Branch, has the responsibility for the prevention, control, and abatement of air and water pollution at its installations.

Reports of IRP Records Search activities were of particular importance to this study as a source of independently generated information about past and present fire fighter training activities, base maps and facility locations ("Installation Restoration Program, Phase I - Records Search, "various installations, 1981-1985). The records search

conducted at each Air Force installation is an assessment of whether or not each past disposal site (including fire fighter training facilities) pose hazards to the public health or

environment from direct contact, migration to surface or ground water, or persistence of the contamination in the environment (Peters, 1985). The search entails an installation-wide study of written historical information and interviews with past and present personnel knowledgeable of past base operations (White, 1984).

The preplanning of training exercises is another option for managing air emissions. This option could include local procedures for on-base and off-base agency coordination/notification, establishing meteorological burn/no-burn decision criteria, selecting an optimum time-of-day for fires, documenting and implementing facility

operating procedures, initiating near-term record keeping and reporting to upper level management through existing environmental management channels, developing positive public affairs aspects associated with fire fighter training exercises, and promoting joint military-public fire department facility use and training exercises.

E. Cultural Resources.

Adverse impacts to cultural resources could occur from the proposed land modifying activities. However, only those cultural resources that, in consultation with the Texas State Historic Preservation Officer, are determined eligible for the National Register of Historic Places need be considered for mitigation of adverse impacts. Mitigation options could range from protection of sites through project redesign, to data recovery through excavation. Mitigation efforts can only be addressed when and if cultural resources are identified and their National Register eligibility has been determined.

F. Water Quality. Every effort will be taken during the design phase of the closed loop water treatment system to minimize potential adverse environmental effects. Design criteria will include proper sizing of holding and treatment ponds to assure that high rainfall events do not create spills of reuse water with unacceptable chemical oxygen demand, particulates, or organic compounds.

G. Conclusions.

After a review of the above mentioned mitigation features there should be no significant adverse impacts that would result from the proposed action on the quality of human or environmental resources, provided the mitigation features are followed. Preparation of an EIS will not be required as a result of the proposed action.

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The persons listed below have had primary responsibility for the preparation of this document.

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APPENDIX A
WILDLIFE SPECIES LISTS

TABLE II-1

PlantsCommon Name

Mesquite

Live oak

Shinnery oak

Juniper

Mexican buckeye

Skunkbush

Greenbriar

Coralberry

Texas wintergrass

Sideoats grama

Condalia

Catclaw acacia

Tasajillo

Prickly-pear

Agave

Texas poppy mallow

Scientific NameProsopis sp.Quercus virginianaQuercus HarvardiiJuniperus sp.Ungnadia speciosaRhus aromaticaSilax sp.Cocculus sp.Stipa leucotrichaBouteloua curtipendulaCondalia sp.Acacia sp.Opuntia leptocaulisOpuntia sp.Agave sp.Callirhoe scabriuscula

TABLE II-2

Reptiles and AmphibiansCommon NameScientific Name

Yellow mud turtle

Kinosternon flavescens

Texas map turtle

Graptemys versa

Texas slider

Pseudemys concinna

Spiny softshell

Trionyx spinifer

Ornate box turtle

Terrapene ornata

Diamondback water snake

Nerodia rhombifera

Blotched water snake

Nerodia erythrogaster

Rough green snake

Opheodrys aestivus

Western cottonmouth

Agkistrodon piscivorus

Hognose snake

Heterodon nasicus

Western coachwip

Masticophis flagellum

Texas night snake

Hypsiglena torquata

Prairie rattlesnake

Crotalus atrox

Racer

Coluber constrictor

Bullsnake

Pituophis melanoleucus

Great Plains rat snake

Elaphe guttata

Desert kingsnake

Lampropeltis getulus

Collared lizard

Crotophytus collaris

Eastern tree lizard

Urosaurus ornatus

Texas horned lizard

Phrynosoma cornutum

Great Plains skink

Eumeces obsoletus

Ground skink

Lygosoma laterale

Prairie racerunner

Cnemidophorus sexlineatus

Southern prairie lizard

Sceloporus undulatus

TABLE II-3

BirdsCommon Names

Red-eyed vireo

Carolina wren

Turkey

Wood duck

Golden-fronted woodpecker

Great horned owl

Screech owl

Belted kingfisher

Yellow-billed cuckoo

Great blue heron

Rough-winged swallow

Wood stork

Bell's vireo

Cactus wren

Bewick's wren

Scaled quail

Bobwhite

Horned lark

Eastern meadowlark

Western meadowlark

Turkey vulture

Mississippi kite

Red-tailed hawk

Swainson's hawk

Scientific NameVireo olivaceusThryothorus ludovicianusMeleagris gallopavoAix sponsaCenturus aurifronsBubo virginianusOtus asioMegasceryle alcyonCoccyzus americanusArdea herodiasStelgidopteryx ruficollisMycteria americanaVireo belliCampylorhynchus
brunneicapillumThryomanes bewickiiCallipepla squamataColinus virginianusEremophila alpestrisSturnella magnaSturnella neglectaCathartes auraIctinia mississippiensisButeo jamaicensisButeo swainsoni

TABLE II-3 CONTINUED

BirdsCommon NameScientific Name

Killdeer

Charadrius vociferus

Common nighthawk

Chordeiles minor

Mourning dove

Zenaidura macroura

Black-chinned hummingbird

Archilochus alexandri

Roadrunner

Geococcyx californianus

Scissor-tailed flycatcher

Muscivora forficata

Ash-throated flycatcher

Myiarchus cinerascens

Ladder-backed woodpecker

Dendrocopos scalaris

Mockingbird

Mimus polyglottos

Red-winged blackbird

Agelaius phoeniceus

Brown-headed cowbird

Molothrus ater

Cardinal

Richmondia cardinalis

Pyrrhuloxia

Pyrrhuloxia sinuata

TABLE II-4

MammalsCommon NameScientific Name

Badger

Taxidea taxus

Black-tailed prairie dog

Cynomys ludovicianus

Plains harvest mouse

Reithrodontomys montanus

Pallid bat

Antrozous pallidus

Ringtail

Bassariscus astutus

Hog-nosed skunk

Conepatus mesoleucus

White-ankled mouse

Peromyscus pectoralis

Opossum

Didelphis virginiana

Fox squirrel

Sciurus niger

Eastern cotton tail

Sylvilagus floridanus

Hispid pocket mouse

Perognathus hispidus

Merriam pocket mouse

Perognathus merriami

Hispid cotton rat

Sigmodon hispidus

Black-tailed jackrabbit

Lepus californicus

White-tailed deer

Odocoileus virginianus

TABLE II-5
THREATENED AND ENDANGERED SPECIES

<u>SPECIES</u>	<u>DOI</u>	<u>TPWD</u>	<u>TOES</u>
Texas poppy mallow	E	NL	E
Guadalupe bass	NL	NL	T
Bald eagle	E	E	E
Golden eagle	NL	NL	T
Peregrine falcon	E	E	E
Merlin	NL	NL	T
Concho water snake	T	E	E
Wood stork	E	NL	NL
Texas horned lizard	NL	E	E

KEY

E - Endangered
T - Threatened
NL - Not Listed

DOI - Department of the Interior
TPWD - Texas Parks and Wildlife Department
TOES - Texas Organization for Endangered Species

TABLE II-6

Endangered/Threatened Species Data File, Texas Parks & Wildlife Department, 05/09/88

COUNTY: Tom Green

ENDANGERED SPECIES

- ***TERN, LEAST, INTERIOR (*Sterna antillarum athalassos*)
- ***VIREO, BLACK-CAPPED (*Vireo atricapillus*)
- **EAGLE, BALD (*Haliaeetus leucocephalus*)
- ***SNAKE, WATER, CONCHO (*Nerodia harteri paucimaculata*)

THREATENED SPECIES

- ***HAWK, ZONE-TAILED (*Buteo albonotatus*)
- ***FALCON, PEREGRINE, ARCTIC (*Falco peregrinus tundrius*)
- ***PLOVER, PIPING (*Charadrius melodus*)
- **IBIS, WHITE-FACED (*Plegadis chihi*)
- **STORK, WOOD (*Mycteria americana*)
- *WARBLER, GOLDEN-CHEEKED (*Dendroica chrysoparia*)
- ***LIZARD, HORNED, TEXAS (*Phrynosoma cornutum*)

***Confirmed species - verified recent occurrence

**Probable species - unconfirmed, but within general distribution pattern of the species

*Possible species - unconfirmed, but at periphery of known distribution of the species

APPENDIX B

TOXIC AND HAZARDOUS MATERIALS MANAGEMENT

INSTALLATION RESTORATION PROGRAM (IRP)

TOXIC AND HAZARDOUS MATERIALS MANAGEMENT

INSTALLATION RESTORATION PROGRAM (IRP)

GOODFELLOW AIR FORCE BASE

South Landfill Site 1

History

South Landfill Site 1 was used from the 1990s to 1970, one portion of the landfill was used as a fire training pit from 1953 to 1958. The wastes disposed of in the South Landfill include demolition debris, industrial waste, containerized liquids, and household solid waste. The average depth of the trenches in the landfill is approximately 15 ft. The site is located at the south end of the Base property and encompasses an area of approximately 1,600 ft by 800 ft.

Previous Studies

During the IRP Phase II-Stage 1 investigation completed in 1987, several monitoring wells were installed around the south Landfill at depth ranging from, 44 ft. to 84 ft. an additional well was installed during the second stage of field investigation. These were installed along the periphery of the site in an effort to monitor the groundwater quality. Also, during the first phase of investigation, soil samples were collected from ten locations and analyzed. After completing Stage 1 and Stage 2 activity and reviewing the data collected, potential public health risk calculations were performed on the analyses received from this site.

Future Investigation

Based on the results of the public health evaluation, it is recommended that a no-further-action decision document be prepared. When approved, this site will be removed from consideration and no further investigation will be performed at South Landfill Site 1.

Drum Storage Area Site 2

History

The Drum storage Area is located at the north end of the Base property near the main gate. The site encompasses an oblong-shaped area, approximately 100 to 150 ft. in diameter, which was used to store several hundred drums in the early 1950's. However, the exact contents of the drums are not known.

Previous Study

During the IRP Phase II-Stage 1 investigation completed in 1987, fifteen test pits were excavated at this site. The test pits were approximately 10.5 ft. deep. Five surface soil samples were collected and analyzed. Also, two soil borings were installed at this site, samples were taken from depths of 0 to 4 ft. and 8 to 10 ft. One of the soil borings was completed as a monitoring well, which was sampled one time, in duplicate. The results of all the samples taken at this site were reviewed by risk assessment personnel who performed a total potential public health risk calculation. The low risk that would result from, lifetime of potential ingestion of under a worst-case scenario does not warrant further action at this Site.

Future Investigation

Based on the results of the public health evaluation, it is recommended that a no-further-action decision document be prepared. When approved, this site will be removed from further consideration and no future investigation will be performed at the landfill Site 3.

Southeast Landfill Site 3

History

The Southeast Landfill is located in the southeast corner of the base property near the end of the old runways. The landfill encompasses an area of approximately 2000 by

800 ft, and was used as a general purpose landfill from 1970 until 1982. The average trench depth in the landfill is approximately 15 ft. Waste types deposited in the landfill were predominately household waste, with small quantities of industrial wastes included.

Previous Studies

The investigation at this site included seven borings that were drilled and completed as monitoring wells around the periphery of the landfill. the borings (monitoring wells) ranged in depth from 48 ft. to 53 ft.. All of these well were sampled and analyzed. Surface soil samples from ten locations were also taken at this site and analyzed. Upon completion of the analysis of the samples taken, a potential public health risk analysis was performed.

Future Investigation

based on the results of the public health evaluation, it is recommended that a no-further-action decision document be prepared. When approved, this site will be removed from further consideration and no future investigation will be performed at the Southeast Landfill Site 3.

Fuel storage Area Site 4

History

The former Fuel storage area is located in a grassed lawn area near the west-central part of the Base and occupies approximately 0.8 acres. The former underground storage tank (UST) site is rather flat, but the general vicinity slopes to the northwest. The area formerly contained nine 25,000-gallon, four 12,000-gallon, one 3,000-gallon, and one 1,000-gallon USTs. The nine larger tanks were reportedly removed in 1976. The times of removal of the other USTs are unknown, however, none exist at this site at this time.

Previous Studies

Two phases of fieldwork were performed at Site 4 to assess the presence and extent of contamination and determine the subsurface geology. The first phase of the investigation involved drilling five soil borings at the former location of the nine 25,000-gallon USTs. Upon completion of the soil borings, it was determined that the installation of five monitoring wells was required. These were installed around the site to verify ground water contamination. Testing these wells revealed that contamination had reached the ground water and further investigation would be necessary. The second phase of fieldwork involved drilling a series of soil borings in the vicinity of the former USTs. In addition to the soil borings, 20 temporary wells were installed to determine the movement of the contamination associated with Site 4. A number of the temporary wells were developed into monitoring wells that will be used in the Remedial Design phase of this project.

Although there are no identified downgradient receptor wells, this plume is cause for concern. The plume is quite large and underlies a residential area. Left unchecked, it will eventually spread off the Base where domestic wells could possibly be installed at some time in the future.

Future Activity

In an effort to determine the water movement required to design a pump and treat system, pump tests will be performed. Upon completion of the pump tests, a Remedial Design will be developed which will be used to perform the Remedial Action required at this site.

Buried Tank Area Site 5

History

Site 5 is an inactive service station located immediately north of Building 421 on 9th Street, approximately 4 blocks north of Site 4. The service station contained two unprotected steel USTs which at one time contained leaded gasoline and possibly diesel fuel. The two USTs have full storage capacities of approximately 5,000 gallons and 25,000 gallons. The tanks were installed in 1944 and taken out of service in 1978.

Previous Studies

No field work other than surface geophysics to confirm The location of the two tanks has been conducted.

Future Investigation

Both of the tanks have been removed and disposed. Soil samples taken after the tanks were removed indicated the tanks had not leaked. It is recommended that a no-further-action decision document be prepared. When approved, this site will be removed from further consideration and no future investigation will be performed at the former Buried Tank Area.